The Progressive Policy Institute's Technology, Innovation, and New Economy Project

The Project's mission is to educate federal, state, and local policy makers about what drives the New Economy, and to foster policies that promote technological advances, economic innovation, investment, and entrepreneurship. Mark Warner is the Project chairman. Mr. Warner is managing director of Columbia Capital, a merchant and investment banking firm in Alexandria, VA. He ran for the U.S. Senate in Virginia in 1996 on a platform of promoting and adapting to the New Economy.

As a part of the Project, PPI has formed a New Economy Task Force composed of elected leaders and New Economy entrepreneurs. The Task Force is being co-chaired by Senate Minority Leader Tom Daschle and Gateway CEO Ted Waitt. The goals of the Task Force are to begin a meaningful two-way dialogue about the challenges of public and private governance in the New Economy; to jointly develop principles and policy priorities for rethinking government policy in the Information Age; and to work to build a new consensus for political change consistent with these aims.

Among the key principles guiding the Project's work are the following:

- Higher productivity and faster economic growth are prerequisites for expanding opportunity and raising living standards.
- The key factors of economic growth are science and technology, world-class education and skills, organizational innovation, robust competition, and open global trade.
- Markets are the best drivers of growth and innovation, but public action can and should create conditions in which innovation can flourish. This requires updating public fiscal, investment, and regulatory policies at every level.
- Archaic regulatory barriers to competition and innovation should be replaced with "open architecture" principles that do not favor one technology or industry over another.
- Government should be reinvented to be as fast, responsive, and flexible as the economy and society with which it interacts. The new model of governing is decentralized, non-bureaucratic, catalytic, and empowering.
- We should take active steps to extend the benefits of technology and innovation to all citizens, reversing current trends toward economic inequality.

The goals of the Technology, Innovation, and New Economy Project are a natural extension of the mission of the Progressive Policy Institute, which is to define and promote a new progressive politics for America in the 21st century. The Institute's core philosophy rises from the belief that America is ill-served by an obsolete left-right debate that is out of step with the powerful forces re-shaping our society and economy. The Institute advocates a philosophy that adapts the progressive tradition in American politics to the realities of the Information Age and points to a "Third Way" beyond the liberal impulse to defend the bureaucratic status quo and the conservative bid to dismantle government.

The Institute is a project of the Progressive Foundation. Will Marshall is President of the Institute. Al From is Chairman of the Progressive Foundation. For further information, to view this report online, or to order other PPI publications, please call, write, or visit the PPI Web site:

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THE NEW ECONOMY INDEX:

Understanding America's Economic Transformation

Robert D. Atkinson and Randolph H. Court

Progressive Policy Institute
Technology, Innovation, and New Economy Project

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"It is not the strongest of the species that survive,
nor the most intelligent,
but the ones most responsive to change."

— Charles Darwin

The U.S. economy is undergoing a fundamental transformation at the dawn of the new millennium. Some of the most obvious outward signs of change are in fact among the root causes of it: revolutionary technological advances, including powerful personal computers, high-speed telecommunications, and the Internet. The market environment facilitated by these and other developments in the last decade and a half has been variously labeled the "information economy," "network economy," "digital economy," "knowledge economy," and the "risk society." Together, the whole package is often simply referred to as the "New Economy."

The story of how businesses are changing in today's economy has been told and retold with such frequency in recent years that it has become something of a cliche: the new rules of the game require speed, flexibility, and innovation. New, rapidly growing companies are selling to global markets almost from their inception, and established companies are being forced to reinvent their operations to stay competitive in the new terrain. This is the part of the New Economy that was born in Steve Jobs' and Steve Wozniak's garage, at Bell Labs, Xerox PARC, and in the trunk of Michael Dell's car. It is Silicon Valley: Netscape, Yahoo!, and the next Big Thing. And of course it is Microsoft, with a market capitalization now second only to General Electric's.

But this New Economy is about more than high technology and the frenetic action at the cutting edge. Most firms, not just the ones actually producing technology, are organizing work around it. The New Economy is a metal casting firm in Pittsburgh that uses computer-aided manufacturing technology to cut costs, save energy, and reduce waste. It is a farmer in Nebraska who sows genetically altered seeds and drives a tractor with a global satellite positioning system. It is an insurance company in Iowa that uses software to flatten managerial hierarchies and give its workers broader responsibilities and autonomy. It is a textile firm in Georgia that uses the Internet to take orders from customers around the world.

It is also as much about new organizational models as it is about new technologies. The New Economy is the Miller brewery in Trenton, New Jersey, which produces 50 percent more beer per worker than the company's next-most-productive facility, in part because a lean, 13-member crew has been trained to work in teams to handle the overnight shift with no oversight.[1]

Yet while the social and political implications of this New Economy are clearly vast, our system for tracking economic progress—the set of indicators we use as a gauge—has not kept up with the pace of evolution. Our statistical system was essentially established to measure a stable economy with most of the output in agricultural and manufactured goods. Until the Great Depression, economic indicators were often measures of natural resources and commodity production: the number of bales of cotton produced, hogs raised, steel ingots melted. (Even today, the United States spends three times more on agricultural statistics than on national income statistics, according to MIT economist Lester Thurow.) After the New Deal and the creation of federal statistical agencies, our economic indicators began to focus on monetary measures related to managing the business cycle. For example, significant effort is made to track the gross domestic product (GDP), inflation and changes in the money supply, business inventories, and consumer purchases thought to affect the business cycle, such as housing and autos. (The first 15 pages of the Congressional Joint Economic Committee's monthly "Economic Indicators" are devoted to these sorts of indicators of the business cycle. It is not until the sixteenth page that the report gets to arguably the most important indicator of economic well-being: productivity.)

The purpose of this report is to draw on a new set of indicators, gathered from existing public and private data, to examine some of the key characteristics of the New Economy.[2] We have divided these indicators into three groups. The first group tracks some of the elemental structural changes that collectively mark the transition to the New Economy: industrial and occupational change, globalization, the changing nature of competition and economic dynamism, and the progress of the information technology (IT) revolution. The second group examines the implications of this transition for working Americans: what is happening to incomes and economic growth, jobs, and employment dynamics. The third group assesses the nation's performance in terms of three main foundations for growth in the New Economy: the pace of transition to a digital economy, investment by business and government in technology and innovation, and progress on the development of education and skills.

Structural Transformation

Beyond the technological advances, what is actually new about the so-called New Economy? In one respect, nothing. We still work at jobs for a living, and we still buy, sell, and trade products and services, just like we always have. As Federal Reserve Chairman Alan Greenspan has noted, the heart of the economy is, as it always has been, grounded in human nature, not in any new technological reality. In Greenspan's analysis, *"The way we evaluate assets, and the way changes in those assets affect our economy, do not appear to be coming out of a set of rules that is different from the one that governed the actions of our forebears.... As in the past, our advanced economy is primarily driven by how human psychology molds the value system that drives a competitive market economy. And that process is inextricably linked to human nature, which appears essentially immutable and, thus, anchors the future to the past."* [3] Nonetheless, Greenspan and other economists agree that some of the key rules of the game are changing, from the way we organize production, to our patterns of trade, to the way organizations deliver value to consumers.

The global economic crisis that began in Asia in 1997 has caused growing concern that one of the fundamental hallmarks of the New Economy, the increasingly complex state of global interconnectedness, may in fact be a harbinger of financial chaos. Many of the Asian economies that were touted as economic miracles for the better part of this decade are now in profound economic and social disarray. Slower growth and falling demand have plunged Russia into default, and now threaten Latin America. No one can precisely predict how these events will continue to unfold, but we believe that the worst-case scenario—a serious world-wide recession—would, at most, only slow the pace of the forces described in this report.

The trends at the heart of the New Economy are long-term *structural* trends. It is true that globalization is one of these new structural realities, and thus business cycles will increasingly tend to be world-wide in scale. But the current problems in Asia and elsewhere should not be seen as inherent features of the New Economy. The troubles are not simply a byproduct of the ability of capital to move instantaneously from market to market at the whims of international investors. Rather, one of the basic reasons for the Asian economic crisis is that Asian economies have not yet fully adapted their institutional structures (particularly their finance, investment, and banking systems), their business practices, or their policies to match the imperatives of the New Economy. In Japan, for example, slow growth in the service sector has hindered overall economic growth. Failure to dismantle barriers to imports and foreign direct investment, along with low levels of entrepreneurship, have limited competition.[4] In turn, there have been insufficient pressures for corporate and financial restructuring. Moreover, low levels of investment in information technology[5] have meant a slower transition to a more digital economy, and a slower overall pace of change.[6]

The fallout of the economic crisis, while extremely destructive and painful in the short term, could eventually yield constructive developments. The turbulence puts pressure on governments to establish New Economy policy frameworks, on industries to embrace new business practices, and on societies to adopt new attitudes. One example of a constructive outcome would be the creation of modern, transparent banking and financial reporting systems which rely on the most realistic vehicle for both national governments and firms to deliver regular financial reports and other information to a worldwide audience in real time—the Internet. Such a system already exists in the United States; public companies must file their required documents and reports in electronic form with the Securities and Exchange Commission so the information can be archived and made immediately available to the public via Edgar, the agency's online database.[7]

The United States is ahead of the curve in a number of areas. Here, one of the most noticeable structural changes in

the New Economy is the degree to which dynamism, constant innovation, and adaptation have become the norm. One of the keys to the recent strong U.S. economic performance has been the country's ability to embrace these changes. Nearly three quarters of all net new jobs are being created by 350,000 new fast-growing "gazelle" firms (companies with sales growth of at least 20 percent per year for four straight years). Almost a third of all jobs are now in flux (either being born or dying, added or subtracted) every year. This churning of the economy is being spurred by new technology, but also by increasing competition, a trend that is in turn partly a product of increasing globalization. Between 1970 and 1997, U.S. imports and exports grew three and a half times faster than GDP in 1992 dollars.

Another striking structural characteristic of the New Economy is occupational change. Between 1969 and 1995, virtually all the jobs lost in the production or distribution of goods have been replaced by jobs in offices. Today, almost 93 million American workers (which amounts to 80 percent of all jobs) do not spend their days making things—instead, they *move* things, process or generate information, or provide services to people.

The Challenge Ahead

Is all of this turbulence, change, and complexity temporary, simply the byproduct of the transition from the Industrial Age to an information era? Or are these intrinsic and permanent aspects of the New Economy? The Progressive Policy Institute believes that the latter is true and that the challenge now is to learn how to manage and govern in an era of sustained and constant innovation and adaptation.

Some see the emergence of the New Economy as disruptive and threatening. Others celebrate it uncritically, ignoring the social strains created by its constant change and uneven distribution of costs and benefits, and rejecting any role for government. PPI subscribes to a third view, embracing the inherent new possibilities born of unleashed entrepreneurial energy for technological and economic progress, while supporting policies that foster growth and innovation, and equip all Americans with the tools they need to succeed. The New Economy is not an end in itself, but the means to advance larger progressive goals: new economic opportunities and higher living standards, more individual choice and freedom, greater dignity and autonomy for working Americans, stronger communities, and wider citizen participation in public life.

Today, though the foundations for the New Economy are in place, widespread benefits haven't yet been realized. Despite job growth, low unemployment, and other notable signs of economic progress—and despite gushing press accounts of fabulous new wealth and opportunities—a central paradox of the emerging New Economy is that the 1980s and 1990s have seen productivity and per capita GDP growth rates languish in the 1.25 percent range, while income inequality has grown. Our challenge is to create a progressive economic policy framework that will encourage a new era of higher growth, while promoting and enabling a broad-based prosperity that produces the widest possible winners' circle.

Old economic policy, shaped by the Great Depression, largely focused on creating jobs, controlling inflation, and managing the business cycle. The New Economy brings new concerns. Technology, as well as a highly competent Federal Reserve policy, may have lessened the importance and severity of the domestic business cycle. We have shown that we can create jobs—over nine million of them in the first five years of the Clinton Administration. And there is general agreement that in the new global economy, with increased competition and technology, the risk of inflation is reduced. The real challenge of economic policy now is to support and foster continued adaptation, including policies that lead to a fully digital economy characterized by continuous, high levels of innovation and a highly educated and skilled workforce.

The nascent transformation to a digital economy, where an increasing share of economic value is a product of electronic means, has the potential to usher in a new period of sustained higher productivity and wage growth in America. Most of the indicators of the transformation to a digital economy forecast steady progress. Computing and telecommunications costs have been falling dramatically, and the U.S. Internet economy is projected to be worth $350 billion by 2001 (when nearly 40 percent of U.S. households are projected to be online). But realizing the digital economy's potential will depend in part on regulatory, tax, and procurement policies—at all levels of government—aimed first at not hindering, and where possible at fostering this transformation. Government also clearly has a role to play in spurring the transformation by encouraging the electronic delivery of public services, though it has taken little more than baby steps in the right direction at this point.

New Economy economists like Paul Romer, Richard Nelson, and Rob Shapiro have focused on knowledge, technology, and learning as keys to economic growth and have begun to focus on how policy can actually affect innovation. A consensus has emerged that investments to develop and commercialize research and technology play a major role in increased standards of living for Americans. However, indicators of innovation and investment suggest cause for concern. In the last five years, federal support for both basic and applied research have fallen precipitously. Industry investment in basic research has also declined. Similarly, over the last decade the stock of machinery and equipment that American workers use to be productive has fallen as a share of GDP.

Education is another economic foundation area showing a lack of sufficient progress. Corporate expenditures on employee training have fallen in the 1990s as a share of GDP. Meanwhile, K-12 performance has simply failed to keep up with the pressing need for a skilled workforce, in spite of continued increases in education spending. We need a set of policies to ensure that American companies have the skilled workers they need to be productive, and that American workers have the skills they need to navigate, adapt, and prosper in the New Economy.

The New Economy puts a premium on what Nobel Laureate economist Douglas North calls "adaptive efficiency"—the ability of institutions to innovate, continuously learn, and productively change. In the old economy, fixed assets, financing, and labor were principal sources of competitive advantage for firms. But now, as markets fragment, technology accelerates, and competition comes from unexpected places, learning, creativity, and adaptation are becoming the principal sources of competitive advantage in many industries. Enabling constant innovation has become the goal of any organization committed to prospering, and should also become the goal of public policy in

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Keys to the Old and New Economies[8]

ISSUE	OLD ECONOMY	NEW ECONOMY
Economy-Wide Characteristics:		
Markets	Stable	Dynamic
Scope of Competition	National	Global
Organizational Form	Hierarchical, Bureaucratic	Networked
Industry:		
Organization of Production	Mass Production	Flexible Production
Key Drivers of Growth	Capital/Labor	Innovation/Knowledge
Key Technology Driver	Mechanization	Digitization
Source of Competitive Advantage	Lowering Cost Through Economies of Scale	Innovation, Quality, Time-To-Market, and Cost
Importance of Research/Innovation	Low-Moderate	High
Relations With Other Firms	Go It Alone	Alliances and Collaboration
Workforce:		
Policy Goal	Full Employment	Higher Real Wages and Incomes
Skills	Job-Specific Skills	Broad Skills and Cross-Training
Requisite Education	A Skill or Degree	Lifelong Learning
Labor-Management Relations	Adversarial	Collaborative
Nature of Employment	Stable	Marked by Risk and Opportunity
Government:		
Business-Government Relations	Impose Requirements	Encourage Growth Opportunities
Regulation	Command and Control	Market Tools, Flexibility

What's New About The New Economy?

The term New Economy refers to a set of qualitative and quantitative changes that, in the last 15 years, have transformed the structure, functioning, and rules of the economy. The New Economy is a knowledge and idea-based economy where the keys to job creation and higher standards of living are innovative ideas and technology embedded in services and manufactured products. It is an economy where risk, uncertainty, and constant change are the rule, rather than the exception. Part I of this report highlights 13 indicators that collectively illustrate the emergence of the structural roots of this New Economy.

GLOBALIZATION

Trade Is an Increasing Share of the New Economy

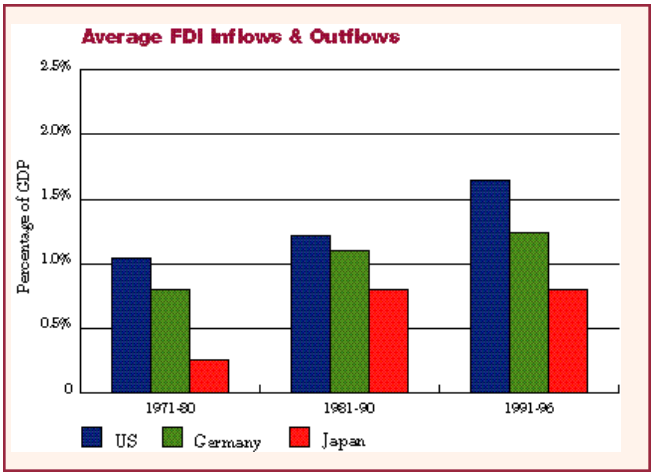
Why Is This Important? The dramatic expansion of trade means more robust competition, which makes constant innovation more critical to success. For that reason, globalization has accelerated industrial and occupational restructuring, leading to the decline of some industries and jobs, and the growth of others. One indicator of the extent of the trend toward globalization is the growing value of exports and imports as a share of the economy.

The Trend: Trade has become an integral part of the United States' and world economies. U.S. exports and imports have increased from 11 percent of GDP in 1970 to 25 percent in 1997. Moreover, the United States is increasingly specializing in more complex, higher value-added goods and services, as reflected in the fact that the average weight of a dollar's worth of American exports is less than half of what it was in 1970.

World exports increased from $1.3 trillion in 1970 to $4.3 trillion in 1995, in constant dollars. And globalization may be about to move up to a new level. Jane Fraser and Jeremy Oppenheim, of the consulting firm McKinsey & Company, have estimated that the value of the world economy that is "globally contestable," which is to say open to global competitors in product, service, or asset ownership markets, will rise from about $4 trillion in 1995 (approximately a seventh of the world's output) to more than $21 trillion by 2000 (about half of world output). According to Fraser and Oppenheim, "We are on the brink of a major long-term transformation of the world economy from a series of local industries locked in closed national economies to a system of integrated global markets contested by global players."[11] This growth will be driven by global capital markets, reduced economic and trade barriers, and perhaps most importantly, technological change, which makes it easier to locate enterprises and sell products and services almost anywhere. For example, online brokerages like E-Trade or Charles Schwab are just as accessible from Singapore or New Zealand as they are from the United States.

"The average weight of a dollar's worth of American exports is less than half of what it was in 1970."

Foreign Direct Investment Is on The Rise Around The World



Why Is This Important? It is now a competitive requirement that businesses invest all over the globe to access markets, technology, and talent. Foreign direct investment (FDI) data are a clear indicator of the trend toward globalization. FDI includes corporate activities such as businesses building plants or subsidiaries in foreign countries, and buying controlling stakes or shares in foreign companies. It doesn't include short term capital flows, such as the portfolio investments of "emerging market" mutual funds.

The Trend: Foreign direct investment has been on the rise around the world since the 1970s. No surprise, the United States, the world's largest economy, sees far greater FDI activity than the other major industrialized economies in sheer dollar terms. But even as a percentage of GDP, U.S. FDI inflows and outflows (the total of American firm investments abroad and foreign firm investments in the United States) are 32 percent greater than in Germany, and over 100 percent greater than in Japan. U.S. foreign direct investment activity has grown from an average of $45.3 billion in the 1970s to an average of $117.5 billion in the first half of the 1990s (in constant 1990 dollars), and from 1.04 percent of our GDP to 1.64 percent.

The Knowledge Economy: Knowledge Producers and Knowledge Users

There is widespread agreement that a defining aspect of the New Economy is the increased importance of knowledge. But what exactly does this mean? There are two important types of knowledge industries to consider: First, there are those industries whose major product is knowledge itself; then there are industries that manage or convey information.

The first group includes industries such as software, biotechnology, and information technology hardware; and occupations such as engineers, scientists, programmers, and designers, whose major output is research that translates into new products and services. These industries are driven not by machinery, skilled shopfloor workers, or even capital—although these all play a role—but rather by individuals engaged in research, design, and development. While these industries make up less than 7 percent of the economy's output, they are in many ways key drivers of the New Economy. Just as capital- and machinery-intensive industries (e.g., autos, chemicals, steel) drove growth in the 1950s and 1960s, knowledge production firms are the growth engines of the New Economy.

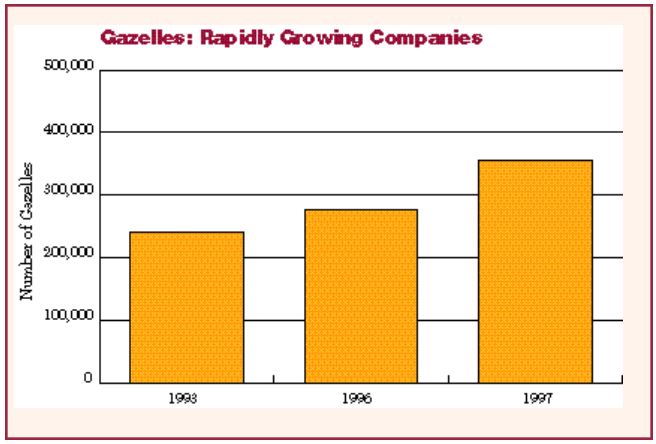
On the other hand, a large share of the economy is now involved in managing, processing, and distributing information. These industries include telecommunications, banking, insurance, advertising, law, medicine, and much of government and education; and occupations such as managers, lawyers, bankers, sales reps, accountants, and teachers. In these industries, effective handling and managing of information, rather than breakthrough knowledge generation, are the keys to success.

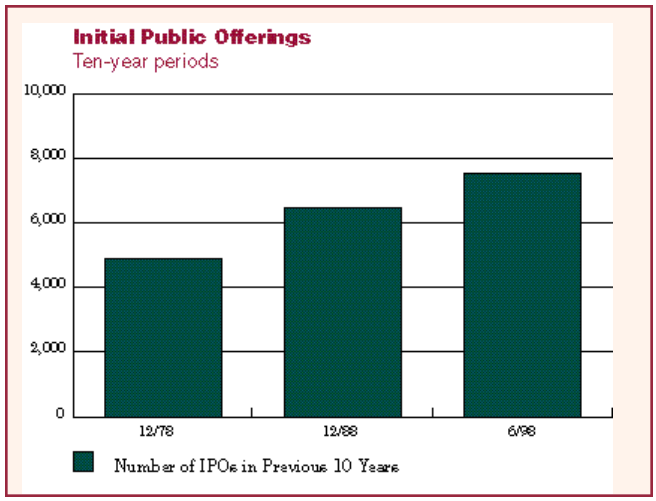
DYNAMISM AND COMPETITION

The Economy Is Spawning New, Fast-Growing Entrepreneurial Companies

Why Is This Important? The ability and willingness of entrepreneurs to take risks and start new, fast-growing companies, coupled with institutions and laws that support entrepreneurship, has sparked growth and job creation. In a quickly changing economy with a premium on innovation, the degree to which the economy is composed of new rapidly growing firms is indicative of innovative capacity. But it is not small firms per se that are the key; it is the relatively small number of fast-growing "gazelles" (companies with sales growth of at least 20 percent per year for four straight years) that account for the lion's share of net new jobs from small companies.

The Trend: The economy is increasingly made up of these gazelles. Since 1993, the number of gazelles has grown 40 percent, to over 355,000. These companies are responsible for creating 70 percent of the net new jobs added to the economy between 1993 and 1996. The small share of gazelles with over 100 employees accounted for 46 percent of total job growth. Additionally, over the course of the last three decades, financial markets seem to have evolved to embrace entrepreneurial dynamism more than in the past. The trend is reflected in the fact that the number of initial public offerings (first rounds of companies' stock sold when they make their debut in the public markets) has been rising steadily, by a total of some 50 percent between the 1960s and the 1990s. Although, the IPO market has cooled considerably in the recent market volatility.

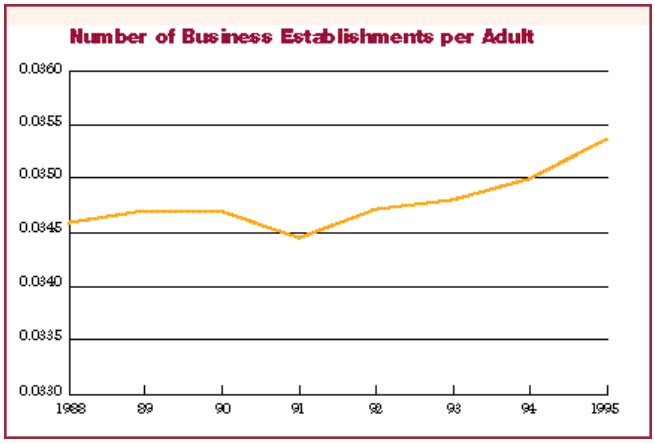


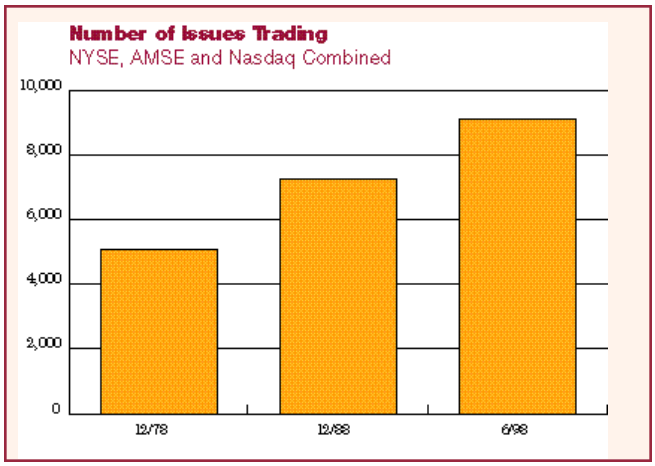


The increased importance of knowledge means that the net stock of intangible capital (e.g., education and research and development) has grown faster than tangible capital (e.g., buildings, transportation, roads, and machinery). Federally-financed intangible capital has increased from 60 percent of the value of federally-financed physical capital in 1970 to 93 percent today.[13] This trend is equally true in business. In the 1960s and 1970s about 25 percent of the difference in average stock price earnings could be attributed to change in reported earnings. By the early 1990s, this had dropped to less than 10 percent.[14] Part of this change is attributable to the fact that the worth of companies is increasingly related to intangible assets (R&D, brands, employee talent and knowledge) that traditional accounting fails to measure.

In the New Economy, intangible capital has become at least as important as tangible capital, and a greater share of the value of tangible capital is based on intangible inputs. As we have become richer, we have increasingly consumed services and goods with higher value-added content. This trend is demonstrated by the fact that the economic output of the U.S. economy, as measured in tons, is roughly the same as it was a century ago, yet its real economic value is 20 times greater[15]. In other words, we have added intangible attributes to goods and services, the most important being knowledge. One example is anti-lock brakes, which are the product of a generation of research and development, and are loaded with electronics. They don't weigh any more than conventional brakes, but they certainly provide a great deal more value to drivers.

Fierce Business Competition





Why Is This Important? Increased competition is being driven by many factors, including the emergence of a global marketplace, the increased number of firms, new technology that makes it easier for firms to enter new markets, and ever-increasing pressure from securities markets to raise shareholder value. In particular, the frenetic atmosphere of mergers and acquisitions, coupled with the increased number of large institutional investors, has meant that firms that do not cut costs and improve financial performance face swift action in equity markets. This competition has meant that companies are less able to insulate workers (e.g., keep wages or the number of employees higher than the market can allow), or invest in "public goods" such as basic research or employee training. In 1992, three-fourths of 531 corporations surveyed identified economic pressures from competitors as one of the primary factors motivating their restructuring efforts.[16]

The Trend: In 1965, IBM faced 2,500 competitors for all its markets. By 1992, it faced 50,000. And IBM is not alone in feeling outside pressure. Whole industries that were sheltered from significant competition, such as transportation, utilities, communications, health care, defense contracting, legal services, and even some quarters of government, now face growing competition. Stable industries have become dynamic. For example, insurance was once a stable industry with a distribution system of local insurance agents. Now it's undergoing significant change, with competition emerging from foreign companies, banks selling insurance, and agent-less competitors like USAA (which relies on phone, fax, and the Internet).

Two measures of competition are the total number of enterprises and the total number of stocks trading in the United States. The total number of enterprises has increased steadily, from 6 million in 1988 to 6.6 million in 1995, and the number of enterprises per (adult) consumer has risen steadily since 1991. The number of issues trading on the New York and American Stock Exchanges and the Nasdaq has almost doubled in the last two decades. Other measures also suggest a more competitive environment. The average price mark-up over cost ratio in manufacturing in the United States decreased from approximately 19 percent in the 1970s to 15 percent between 1980 and 1992—which was among the lowest of all Organization for Economic Co-operation and Development (OECD) nations—suggesting that increased competition has held down prices.[17] Accordingly, the share of the U.S. economy subject to foreign competition has risen from an estimated 18.8 percent in 1985 to 27.7 percent in 1994.[18]

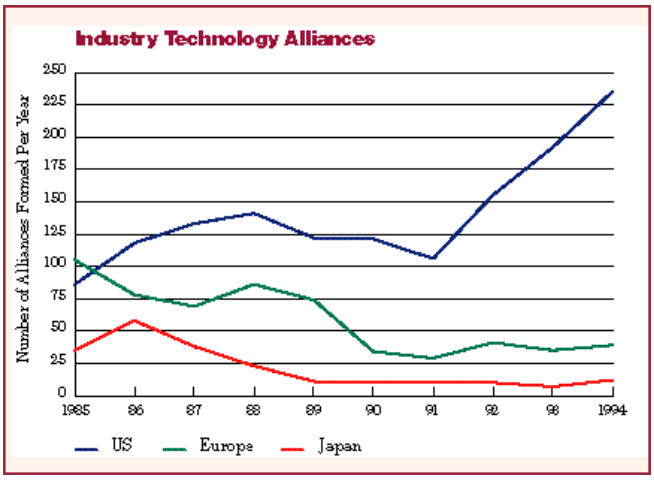
"In 1965, IBM faced 2,500 competitors for all its markets. By 1992, it faced 50,000."

DYNAMISM AND COMPETITION

"Coopetition" In The New Economy: Collaboration Among Competitors

Why Is This Important? Innovation and value are more and more commonly generated in networks. In fact, management guru Peter Drucker and other experts have suggested that the collaborative dynamic of networks, partnerships, and joint ventures is a main organizing principle in the New Economy. Social capital (networks, shared norms, and trust), as fostered in collaboration and alliances, may be as important as physical capital (plant, equipment, and technology), and human capital (intellect, character, education, and training) in driving innovation and growth.

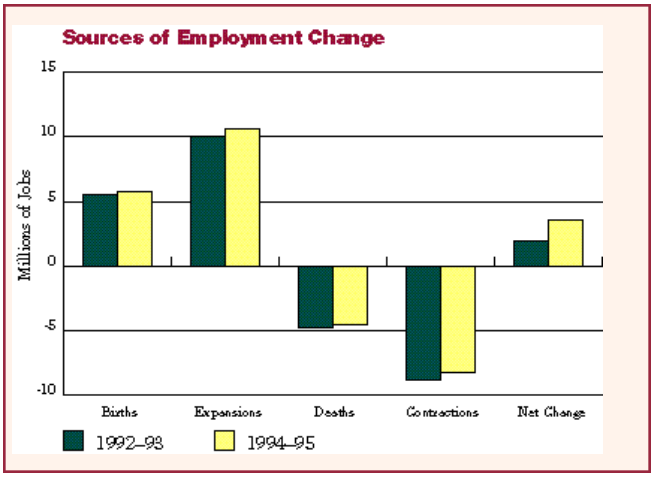
The Trend: Though competition for market position has been increasing in the New Economy, so has the frequency of collaboration among competitors. Firms, through a growing array of partnerships, increasingly turn to suppliers, customers, universities, and federal laboratories for sources of technology and innovation. Indeed, a proliferation of networks of organizations, in the form of partnerships and consortia, has contributed to the successful renewal of the U.S. economy by ratcheting up technological innovation.[19] While Europe and the United States had approximately the same number of industry technology alliances in 1985, alliances in the United States have since boomed, especially in the 1990s, while they have declined significantly in Europe and Japan.



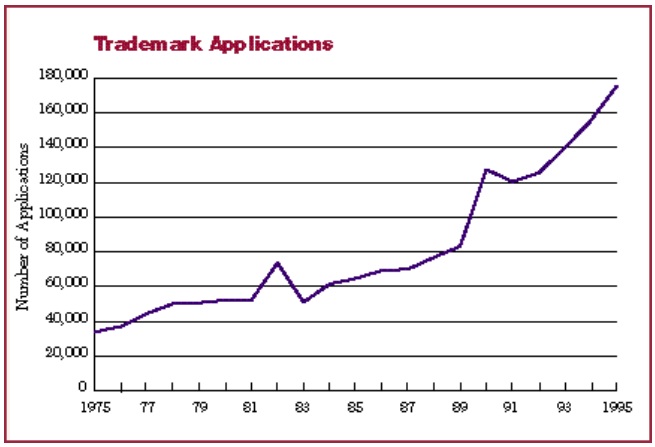
The New Economy is Constantly Churning

Why Is This Important? Slow and steady growth in net total employment masks a constant churning of job creation and destruction. This churning has accelerated as the number of firms being born and dying every year has grown. The faster pace of job churning has undermined the predictability and stability of old economic arrangements and has increased the insecurity faced by workers. However, while such turbulence increases the economic risk faced by workers, companies, and even localities, it is also a major driver of economic innovation and growth. As less innovative and efficient companies die or contract, more innovative and efficient companies take their place. In fact, this turbulence is one of the factors that has let the U.S. economy surpass Europe and Japan, where entrepreneurship and dynamism is less vibrant and job protection more prevalent.

The Trend: Between 1994 and 1995, as the private sector added a total of 3.6 million new jobs, new establishments created 5.8 million jobs while dying establishments eliminated 4.5 million others. Expanding establishments created 10.6 million jobs while contracting ones lost 8.2 million. The period saw a net growth of 108,000 additional business establishments—a product of 695,000 births and 587,000 deaths (up from only 337,000 births and deaths, combined, in 1975). And while firms can grow fast, they can go out of business or downsize just as quickly. In fact, 30 percent of all jobs a year are in flux (either being born or dying, expanding or contracting). Even that last bastion of job security, government, has been undergoing its own restructuring, outsourcing, and downsizing.



Consumer Choices Are Exploding



Why Is This Important? The New Economy is no longer a mass production economy where, as Henry Ford is reported to have said, "You can have a Model T in any color as long as it's black." The rise of production processes based on information technology has allowed companies to develop "flexible" factories and offices in which costs rise little when variety expands. More flexible and agile companies are better able to efficiently target new and diverse markets. Moreover, fiercer business competition has meant that companies are constantly developing new products and services in order to gain new markets. Consumers benefit because their needs are more specifically addressed.

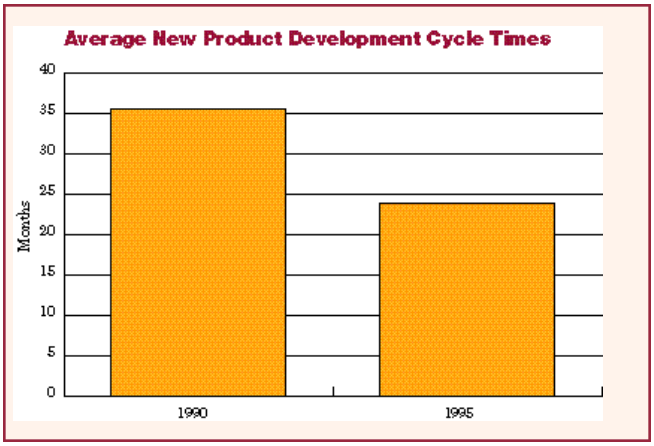
The Trend: One indicator of expanding consumer choice is the number of trademarks filed by companies. Between 1984 and 1989, the number of trademarks filed grew steadily. However, since 1989, filings have taken off, increasing from about 80,000 per year to 180,000 per year in 1995. Other indicators also suggest growing consumer choice. The average number of products in grocery stores has increased from under 13,000 in 1980 to 30,000 in 1998. Similarly, the average number of magazines published has increased from 2,500 in 1987 to 4,400 in 1997. Overall, an estimated 50,000 new products are announced every year in America, up from only a few thousand annually in 1970.[20] In a broad range of product and service categorizes, Americans are offered an expanding array of choices. In fact, the brand that has the largest market share in many consumer markets today is "other."[21]

"An estimated 50,000 new products are announced every year in America, up from only a few thousand annually in 1970."

DYNAMISM AND COMPETITION

The New Economic Order: Speed Is Becoming The Standard

Why Is This Important? Fierce competition coupled with a new wave of innovation and technology-based products and services have shortened cycles between their market introduction and eventual replacement by superior products and services. The ability to innovate and get to market faster is becoming a more important determinant of competitive advantage. In some sectors, such as information technology, the pace of innovation causes such rapid obsolescence that firms have to run just to stay in place. Computer components, for example, lose about 1 percent of their value per week.[22] In other sectors, such as automobile manufacturing, global competition has led to compressed product development cycles.

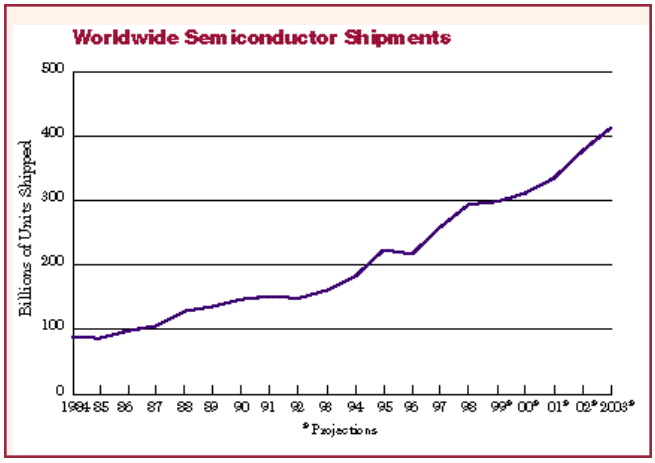


The Trend: One study found that in 1990 new U.S. products took an average of 35.5 months to complete, but by 1995 companies were introducing new products in an average of approximately 23 months. This trend affects a host of industries. Autos that took six years from concept to production in 1990 now take two years. Thirty percent of manufacturing company 3M's revenues are from products less than four years old. Similarly, 77 percent of Hewlett Packard's revenues are from products less than two years old. New products accounted for a third of corporate products in the 1980s, up from 20 percent in the 1970s.[23] IBM had over 30 percent of its 1995 patents incorporated into products by 1996. Moreover, the speed of processing goods and services has also gone up. Between 1979 and 1997, the ratio of unfilled orders to shipments for U.S. manufacturers declined by 25 percent.[24]

Now, in the frenetic Internet economy, people talk about technological evolution in "Web years" (three months of a normal year) because the rules of the game seem to change that often. One payoff of this increased speed is greater consumer choice, in terms of time (consumers can bank around the clock now), product and service diversity (choices of scores of magazines, TV stations, etc.), and type of consumer-business interaction (telephone, email, "snail mail," as the physical postal service has affectionately been dubbed, and good old-fashioned human interaction, now jokingly referred to as "face mail" by Microsoft employees).

"Now, in the frenetic Internet economy, people talk about technological evolution in 'Web years' (three months of a normal year) because the rules of the game seem to change that often."

Microchips Are Everywhere

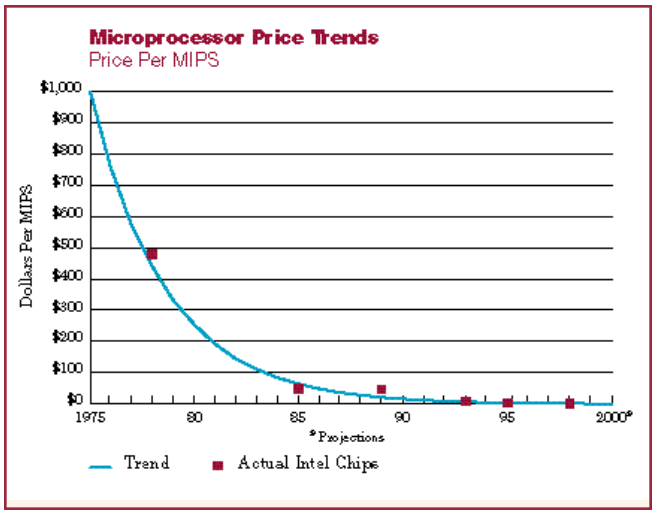


Why Is This Important? There may be no better testament to the fact that we have passed from a mechanized, industrial era into a new, digital era than the proliferation of semiconductor technology—the combination of integrated circuits (chips) and other discrete components found on circuit boards in everything from desktop computers to phones, cars, kitchen appliances, medical devices, and even roads.

The Trend: The world's appetite for semiconductors has been growing dramatically, and the trend (despite recent market weakness) is expected to continue. In 1984, worldwide shipments of semiconductors totaled 88 billion units, and by 1997 world shipments were close to 260 billion units—nearly a 200 percent increase. By 2003, the number is expected to pass the 400 billion unit mark.

From 1982 to 1996, the world semiconductor market has grown from a $20 billion market into well over a $100 billion market in constant 1992 dollars. In the same period in the United States, semiconductor sales as a percentage of GDP rose from less than 0.2 percent to as high as 0.65 percent, all while dropping in price.

Computing Costs Are Plummeting



Why Is This Important? Information technology—everything from faxes and phones to computers and the Internet—is transforming businesses and industries. Information technology is increasing efficiencies, cutting costs, driving customization of products and services, and increasing the speed of commerce. The trend is also enabling the emergence of whole new industries and products, as witnessed by the hundreds of thousands of new jobs created by the Internet.

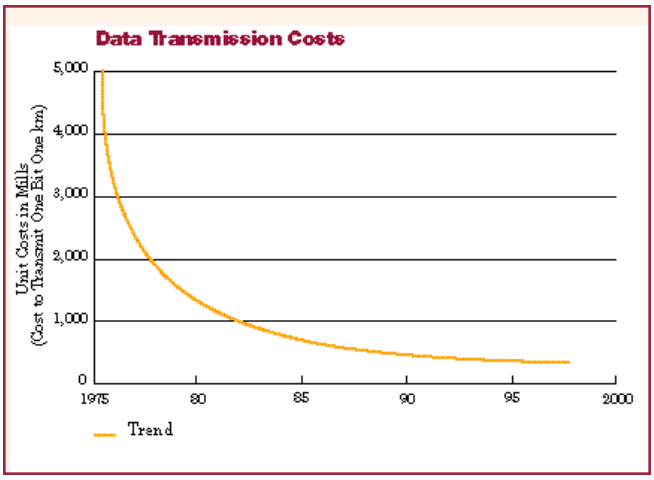
The Trend: Moore's Law (named after Gordon Moore, a founder of Intel), which says that the processing power of microchips doubles every 18 months, has a corollary: the cost of computing is dropping by nearly 25 percent per year. In 1978, Intel Corporation introduced its 8086 chip, which defined the base architecture for the later x86 series (including the 386, 486, and Pentium chips). It contained 29,000 transistors. Four years later came the 286, with 134,000 transistors. Three years after that, the 386 had 275,000 transistors. And on the trend goes: the Pentium Pro, introduced in 1995, had 5.5 million transistors in its core central processing unit. Meanwhile, the cost of all that computing power has been dropping precipitously. In 1978, the price of Intel's 8086 was 1.2 cents per transistor, and $480 per million instructions per second (MIPS). By 1985, the 386 cost 0.11 cents per transistor and $50 per MIPS. Ten years later, the Pentium Pro's introductory price amounted to 0.02 cents per transistor, and $4 per MIPS. And the prices are expected to continue to fall.

Data Transmission Costs Are Plummeting

Why Is This Important? One of the chief enablers of the New Economy is instantaneous global communications: the ability to easily send and receive data—everything from documents to video and multimedia—inexpensively. One measure of progress in that direction is the cost of data transmission.

The Trend: The cost to transmit one bit of data over a kilometer of fiberoptic cable declined by three orders of magnitude between the mid-1970s and the beginning of the 1990s, allowing more data to be transmitted over longer distances at lower prices.

Technologies for transmitting data are also getting more and more powerful. For example, technology recently developed by Lucent transmits 3.2 terabits —which is approximately equal to 90,000 volumes of an encyclopedia— per second.



"Moore's Law, which says that the processing power of microchips doubles every 18 months, has a corollary: the cost of computing is dropping by nearly 25 percent per year."

New Economy Outcomes: Impacts on Americans

As Section I illustrates, America is in the midst of an economic transformation. This section examines its impact on the well-being of Americans. We pay specific attention to productivity and income growth, the number and types of jobs being produced, un- and under-employment rates, and work stability and risk. The means to these end results may change in new economic times, but the importance of the end results themselves does not.

Conventional indicators give the appearance of strong economic performance. Jobs are up. Inflation and unemployment are down. And despite recent volatility, the stock market has boomed in the 1990s. However, more fundamental measures of economic well-being, particularly per capita GDP, productivity, and wage inequality, suggest that the New Economy has not yet realized its full potential. Ensuring that it does is the key mid- and long-term policy challenge in the New Economy.

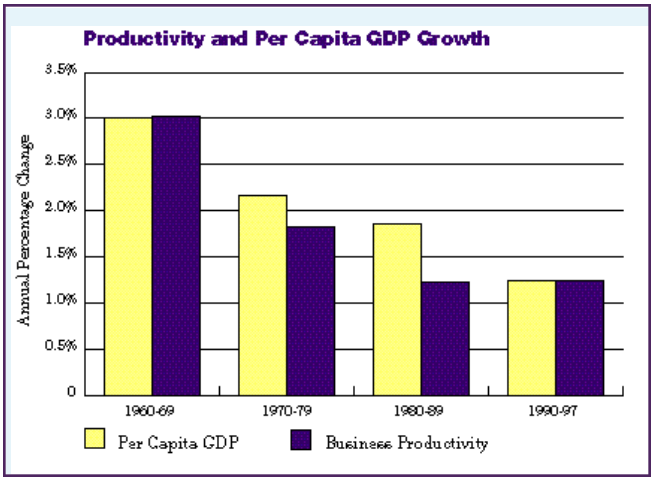
IMPACTS ON AMERICANS

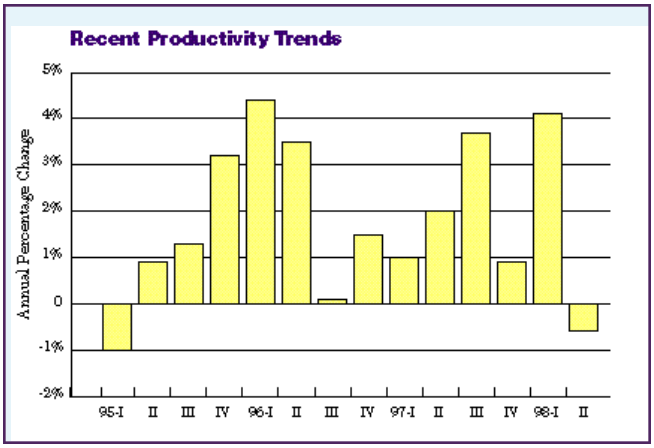
Productivity Growth is Lagging

Why Is This Important? The growth in productivity (defined as the value of goods and services produced per hour of work) and, by extension, per capita incomes, is the most important measure and determinant of economic performance. It is this measure, as opposed to the value of the stock market, the rate of inflation, or the trade balance, that determines the real standard of living of Americans. A return to the more robust productivity growth of the 1960s and early 1970s would make it easier for the federal government to pay off the national debt, finance social security, reduce poverty, lower taxes, and invest in health care, education and training, and other social needs.

The Trend: The trend is not good. Productivity and per capita GDP growth rates have slowed significantly since the 1960s to less than 1.25 percent per year in the 1980s and 1990s. At this rate it will take until the year 2024 to increase our per capita standard of living 50 percent and until 2047 to double it. While some of this slowdown is a statistical by-product of the difficulty of measuring productivity in the New Economy, there is no doubt that a significant share of it reflects a real productivity slowdown. Almost all of the slowdown has been in the service sector where the application of efficiency-enhancing technology has been more difficult.[25] In the last few years, both productivity and wage growth have been stronger, but it is too early to tell if this portends a shift to a new growth period. Restoring productivity growth to higher levels is one of the central economic challenges in the New Economy.

Lagging productivity goes a long way towards explaining slow wage growth. If productivity had increased after 1973 the way it did in the 30 years before, half of all American households would now be earning at least $63,000, instead of the current $37,000. If annual productivity growth rates increased 1 percent faster from now until the year 2025, the median American household income would be $17,000 more per year than if growth continues at its current pace. Some have argued that it is not slow productivity growth that has caused wage growth to lag, but rather high corporate profits, which come at the expense of wage growth. But if profits had increased at the same rate as wages, and the difference was paid out in the form of higher wages, real wages would have gone up a mere four percent more between 1978 and 1997 (20 percent instead of 16 percent). The major reason for the slowdown in wage growth for the average American has been a combination of very slow productivity growth and uneven distribution of wages, particularly in the 1980s. (Wages of college-educated workers have grown while wages of less-educated workers have remained stagnant.)





"If productivity had increased after 1973 the way that it did in the 30 years before, half of all American households would be earning at least $63,000 instead of the current $37,000."

Explaining The Productivity Paradox

Nobel Prize-winning economist Robert Solow has said that we see computers everywhere except in the productivity statistics. That productivity measures do not seem to show any impact from new computer and information technologies has been labeled the "productivity paradox." Productivity growth has slowed every decade since the 1960s while investments in information technology have grown dramatically. Some take this as proof that information technology doesn't affect productivity.

Yet the real reason for the productivity paradox may lie in the fact that the U.S. economy is neither fully in the old mechanized economy nor yet in the new digital economy. The animating force in the old economy was the desire to mechanize goods production and handling—to automate the assembly line and the farm. And this effort has paid off handsomely, with 3 percent to 4 percent productivity growth per year in manufacturing and agriculture for the last 100 years. But now, with over 80 percent of jobs in the service sector, where productivity is growing at less than 1 percent per year, mechanization has run its course as the predominant driver of productivity. Until recently, it has proven difficult to introduce the kinds of productivity-enhancing technologies in many service industries that are used in manufacturing. But the next big motor force of productivity improvement, digitization, is only in its early stages and hasn't yet reached the critical mass necessary to significantly affect macro-economic productivity statistics.

Make no mistake, application of information technology does improve productivity. Since the 1970s, productivity has grown about 1.1 percent per year for sectors that have invested heavily in computers and approximately 0.35 percent for sectors that have invested less heavily.[26] Research by MIT economists shows that in the 1990s computers contribute significantly to firm-level output and productivity.[27] But the effects have been concentrated in a limited number of firms and industries.

As we make the transition to a more digital economy, the effects are likely to be felt economy-wide. It wasn't until the early 1990s that microprocessors were fast and cheap enough to really work well in a wide range of applications. Pentium computer chips weren't introduced until 1993. The Internet didn't begin to become a mass medium until 1994. Emerging new technologies such as smart cards, voice-based computing, video telephony, "expert system" software, and the "Next Generation Internet" are just now beginning to arrive. When these and others are widely used, and when a majority of the economy and society are linked through digital networks, it will be possible to speak of a nearly complete digitization of the economy. When this happens, a large share of economic functions will be conducted through digital information technology, while paper (e.g., cash, forms, files) and routine face-to-face (e.g, clerks, order takers) transactions will become less important, leading to significantly increased efficiencies. For example, while the cost of a teller transaction at a bank is $1.07, the cost of a similar online banking transaction is one cent.

As a result, the animating force for productivity and wage growth in the New Economy will be the pervasive use of digital electronic technologies to increase efficiency and productivity, particularly in the heretofore low-technology service sector. The digitization of the economy in the 21st century promises to bring the kinds of economic benefits to Americans that mechanization brought in the 20th. And this will be spurred by the "network effect"—the more Americans use these technologies (e.g., Internet, smart cards, broadband telecommunications), the more applications will be developed, and the more value they will provide for users. Once this occurs, the productivity paradox could very likely give way to a productivity and wage boom. Government can play an important role in facilitating the transition to a digital economy by adopting laws and regulations that explicitly support and advance electronic commerce.

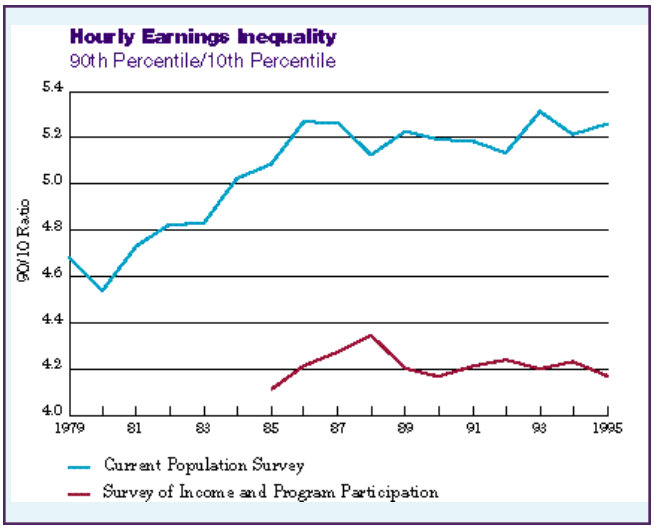
IMPACTS ON AMERICANS

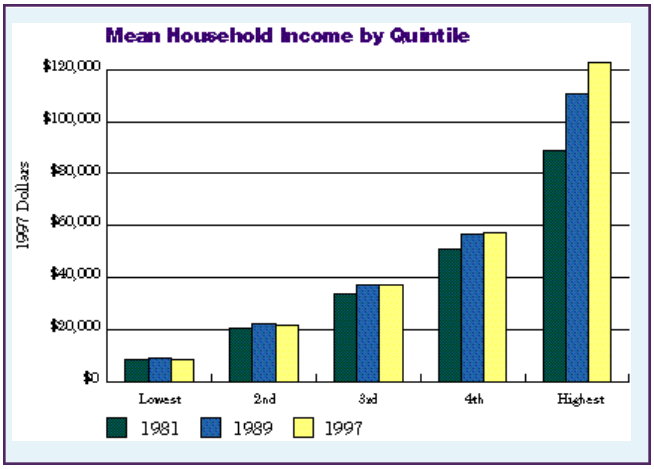
The Growth Of Earnings Inequality Has Slowed

Why Is This Important? The economic welfare of Americans is determined not just by growth, but by the distribution of that growth. If Americans lose faith in the promise that a "rising tide lifts all boats," support for economic policies that raise the tide will ebb.

The Trend: Since the mid-1970s, incomes have become more unequal, not only in the United States but in most developed nations. However, it appears that most of the increase in hourly wage inequality occurred in the 1980s, with little or no growth in the first half of the 1990s (through 1995). Even studies that show a higher increase in income inequality generally find that the rate of increase has slowed since 1989.[28] In fact, between 1996 and 1998, hourly wages of workers in the top 90th percentile grew slower than they did for workers in the 50th and 10th percentiles.[29]

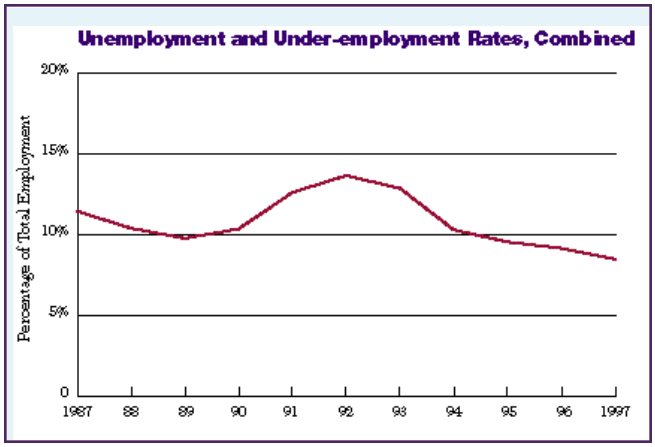
In contrast to individual earnings trends, inequality of family income has continued to grow. Between 1980 and 1996, real incomes went up 58 percent for the wealthiest 5 percent of American households, but less than 4 percent for the lowest 60 percent. But in the 1990s, demand-side labor market forces related to trade, foreign investment, or new technologies can no longer be considered the main causes of this growing inequality. The dominant factors appear to be the increasing share of one-parent families and increasing incomes for wives of men who are high earners.





Between 1996 and 1998, the hourly wages for individual workers in the top 90th percentile grew slower than they did for workers in the 50th and 10th percentiles. But inequality among households has continued to grow.

Fewer Workers Are Unemployed and Under-employed

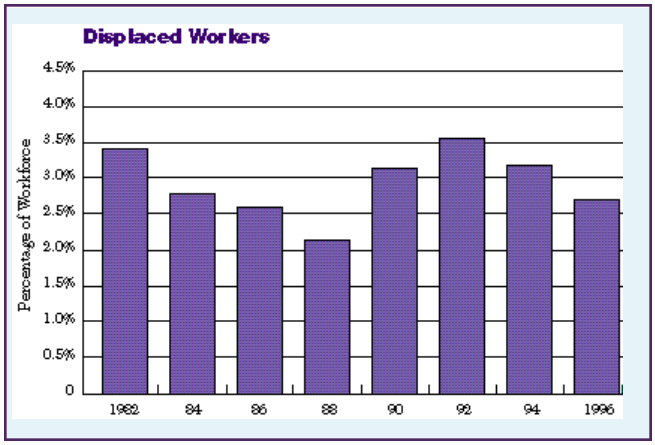


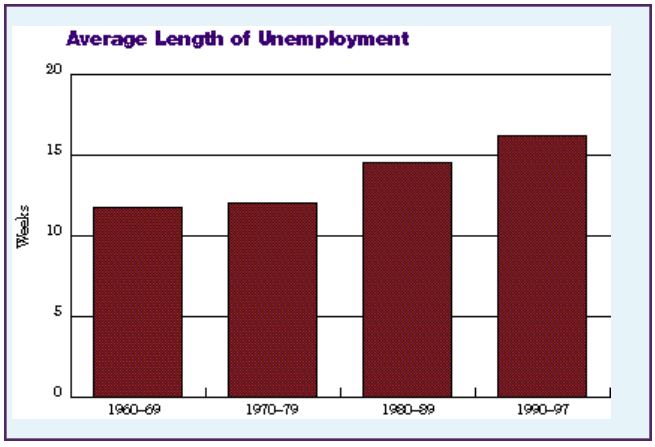
Why Is This Important? Ensuring that all Americans who want to work are able to is the goal of any economy, new or old. One indicator of progress in that direction is the share of Americans who are either unemployed or involuntarily working part-time instead of full-time (under-employed).

The Trend: Together, unemployment and under-employment declined as a percentage of total employment from 11.4 percent in 1987 to 9.7 percent in 1989, but increased in the recession of the early 1990s. In 1997, at a similar period of the business cycle, the figure was down to 8.4 percent.

In the New Economy, even in periods of low unemployment, the United States should be able to enjoy lower levels of inflation than were the norm in the 1970s and 1980s for two reasons. First, technology contributes to a reduced risk of inflation by allowing companies to avoid production bottlenecks. Second, globalization and other forces leading to increased competition in product and labor markets tend to hold prices down by reducing the ability of workers to excessively bid up wages—and the ability of companies to raise prices—faster than productivity increases.

Modest Increases In Worker Displacement





Why Is This Important? One way that a more dynamic, open, and efficient economy can affect workers is by making the labor market more volatile, both in terms of the number of workers losing their jobs and the average length of unemployment. Somewhat higher levels of employment volatility have increased the anxiety of many American workers and may make them less willing to embrace the New Economy.

The Trend: Despite popular accounts that large layoffs have come with new rapidity, the data show that layoffs are largely cyclical in nature and have only modestly increased in the 1990s. Worker displacement (workers with three or more years of job tenure who are laid off either permanently or temporarily) has declined each year since the height of the 1990 and 1991 recession, but remains slightly higher than in equivalent periods in the 1980s. Moreover, the composition of layoffs has changed. Today, a greater share of layoffs are permanent rather than temporary, and layoffs increasingly affect white collar rather than blue collar workers.

Even though unemployment is down and layoffs are up only slightly, workers are remaining unemployed longer. The average duration of unemployment has increased from approximately 12 weeks during the 1960s to over 17 weeks in the 1990s. Long-term unemployment has increased even more, rising 130 percent from 1975 to 1994. This trend appears to apply to all demographic groups and all OECD nations—in fact, the rate of increase in the United States is among the lowest, well below the increase in Germany (320 percent), Canada (250 percent), and France (245 percent). This increase in the time it takes some workers to get back to work is closely tied to the increase in technological change, as some workers' skills do not adapt to changing occupational demands.[30]

IMPACTS ON AMERICANS

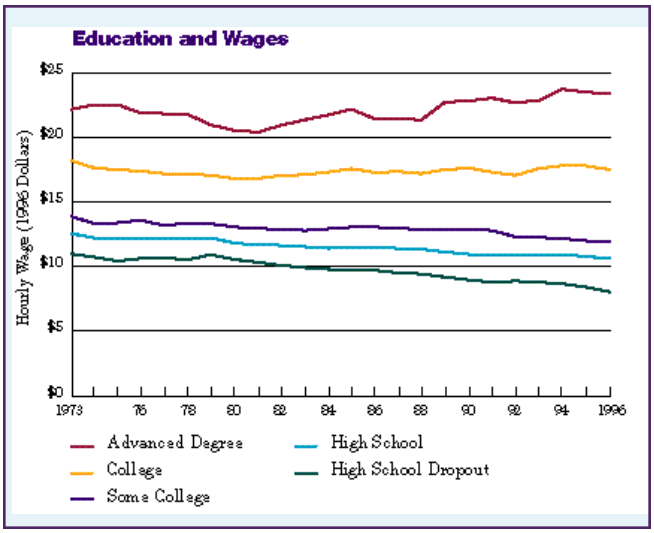
The Wage Premium For Skilled Jobs Is Growing

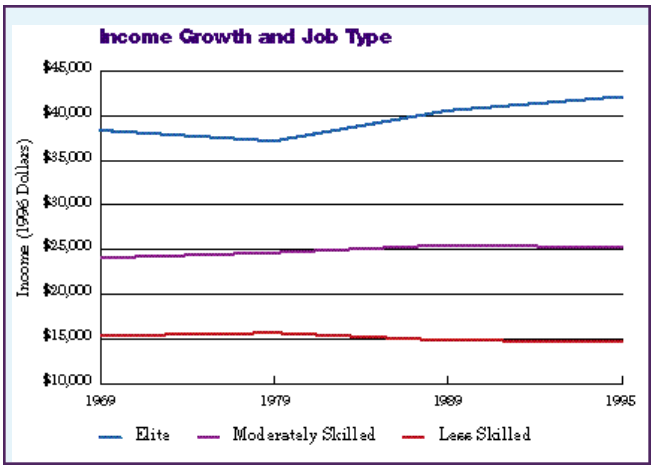
Why Is This Important? The early stages of the New Economy have seen income growth increasingly tied to education and occupation. Increasing the educational and skill levels of American workers will foster reduced wage inequality and faster economic growth. But it will take more to significantly increase wages for the bottom half of the workforce. New technologies and work reorganization can help make many lower-skilled, labor-intensive service sector jobs (which now account for a quarter of all jobs[31]) more productive, allowing them to pay higher real wages.

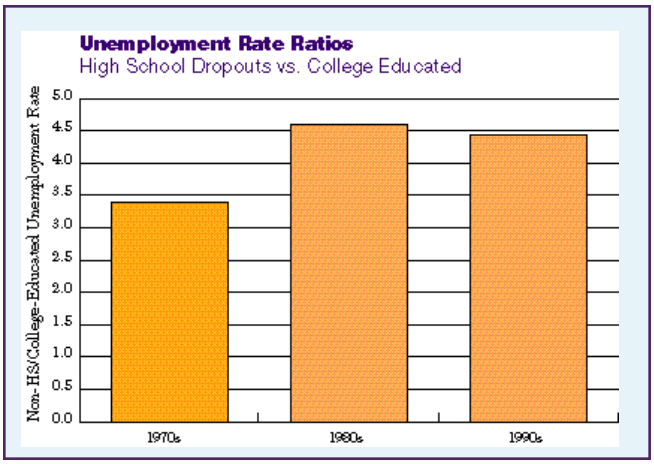
The Trend: A key factor in the increasing earnings gap has been the increased wage premium paid to higher education and skills. Since the 1970s, only those with a college degree have seen their wages go up, while those with less than a college degree, particularly those with only a high school degree or less, have seen their real wages fall. Education also increasingly determines unemployment. In the 1970s, a high school dropout was 3.5 times more likely to be unemployed than a college graduate. In the 1980s and 1990s, that ratio has increased to 4.5.

But in the New Economy it is not just education that determines economic circumstances, it's also occupation. Occupations that require higher skills now pay a higher premium. For example, among college-educated workers, only those with managerial and professional ("elite") jobs saw wage gains in the last decade. Similarly, compensation paid to more-skilled precision production workers grew 2.3 times as fast as compensation to lower-skilled laborers. In the last 20 years, compensation for managerial and professional work increased, while incomes of moderate-skill jobs remained stable and incomes of less-skilled jobs declined. Overall, compensation in elite jobs grew 2.5 times faster than in blue collar occupations and 4.3 times faster than service occupations between 1987 and 1996.[32]

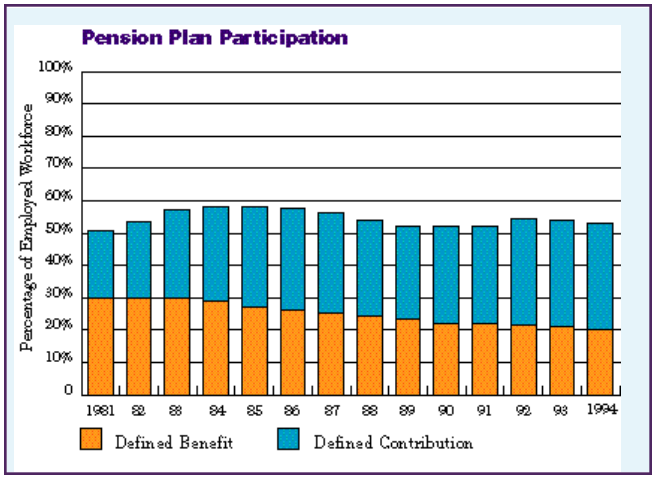
"Occupations that require higher skills now pay a higher premium."

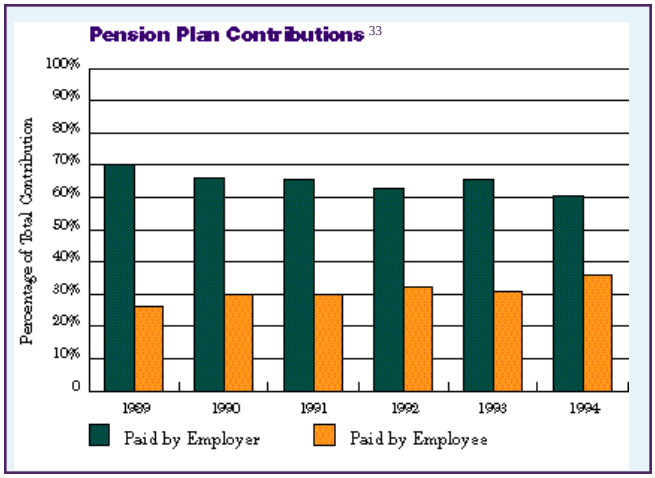


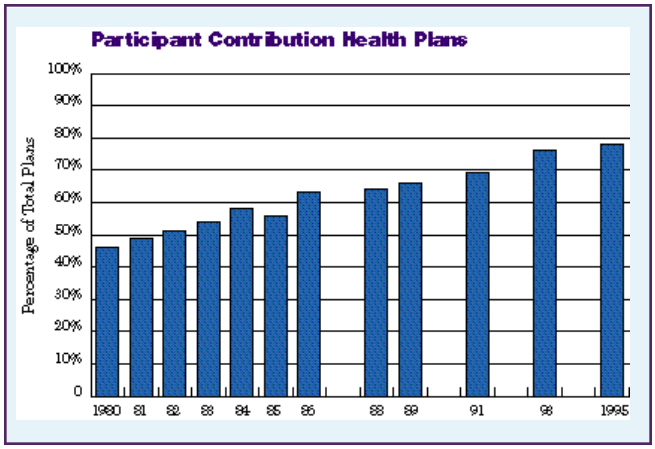


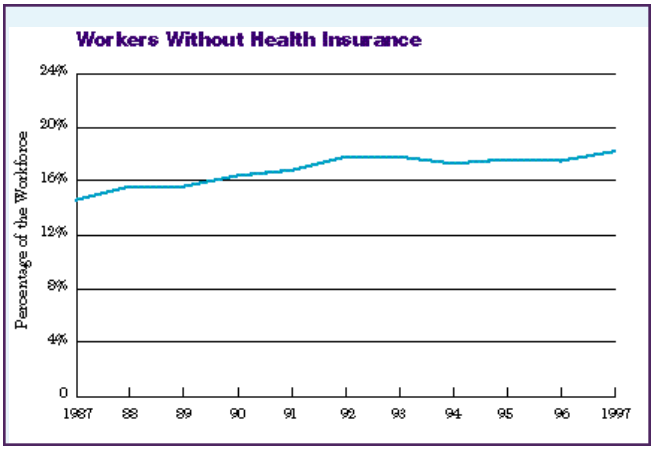


Employee Benefits Have Fallen









Why Is This Important? In addition to wage levels, a key indicator of the well-being of workers is the set of benefits they receive, in particular retirement and health care. We are shifting from a period when employers provided many elements of family security to one where workers must now take greater personal responsibility for sources of economic security.

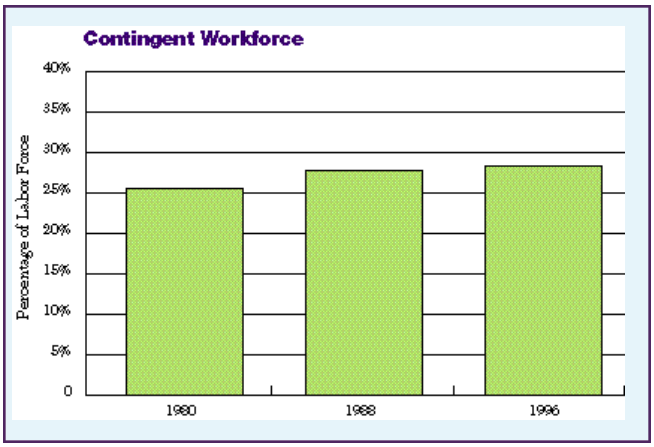
The Trend: In general, a smaller percentage of American workers are receiving benefits today than 15 years ago. The share of workers receiving defined-benefit pension plans has fallen from approximately 30 percent of the workforce in 1981 to 20 percent today, while the share of workers receiving pension plans of any type has fallen slightly since the mid-1980s. With the continuing rise of 401-K and other defined-contribution plans, employees are paying a greater share of total pension costs. Likewise, the share of workers without health coverage has increased slightly from about 15 percent of the workforce in 1985 to 18 percent in 1995. And, as the cost of health care has increased, the share of health plans requiring matching contributions from employees has increased significantly.

IMPACTS ON AMERICANS

Modest Increases In Contingent Work

Why Is This Important? One claim made by many about the New Economy is that while U.S. corporations are restructuring successfully, they are doing it by converting full-time, permanent jobs into part-time, temporary, and contract work. Data on the share of workers who are "contingent" suggest that this claim is overstated.

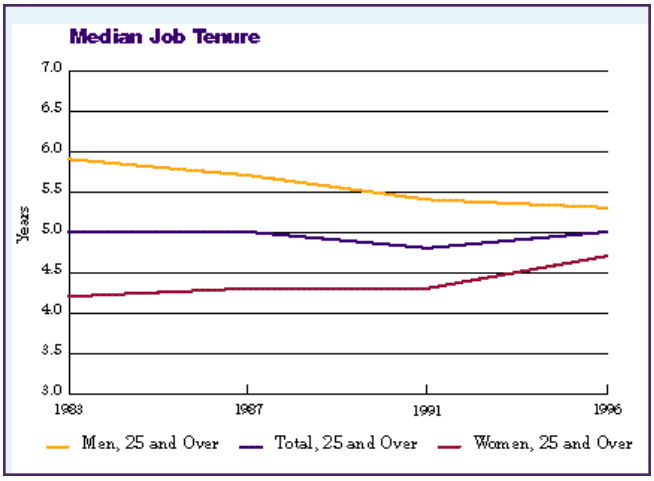
The Trend: Using the broadest definition of contingent work—namely, part-time, contract, and temporary workers—it is clear that the share of the workforce that could qualify as contingent has grown slowly, from about 25 percent in 1980 to about 28 in 1996. In some regions of the country, such as Silicon Valley, contingent workers appear to have grown as a share of the workforce. Similarly, some occupations are more affected than others. However, overall contingent work is not the nature of work in the 1990s. In 1995, fewer than one in 10 workers—9.9 percent of the total workforce (12.1 million people)—had alternative work arrangements (8.3 were independent contractors, 2 million were working "on call," between 1.2 million and 2.1 million were working for temporary help agencies, and 652,000 were working for contract firms).[34] Workers who expected their jobs to end within a year made up an even smaller share—2.8 percent of the workforce. And overall, with the exception of temp jobs, which increased from 1 million in 1986 to 2.1 million in 1997, these numbers have increased slowly, if at all. For example, between 1975 and 1994, self-employment (the largest contingent group—85 percent of the "independent contractor" category) remained level at 8.7 percent (10.6 million), an all-time low.[35]



Workers Experience Less Job Stability

Why Is This Important? Even though most Americans still have full-time, permanent employment, the nature of this employment has changed. One aspect is declining employment tenure. As new companies spring up and established companies respond to change and competition, fewer and fewer workers can look forward to long careers with a single employer. Employees must now continually reinvent themselves throughout their working lives, even if they remain with the same employer.

The Trend: At first glance, median job tenure appears to have been holding steady. This is largely because as women have been in the labor force longer their tenure has been on the rise, and as the Baby Boom generation ages it moves into more senior positions where tenure is longer. But men's median tenure fell between 1983 and 1996 in nearly every age group. For example, tenure for men aged 45 to 54 fell from 12.8 to 10.1 years. Job tenure in the United States is half as long as it is in other OECD nations. These changes help explain why many Americans are anxious about the New Economy, particularly since many people affected may not be choosing these arrangements voluntarily. One reason some workers may be changing jobs more often, however, is that the costs of switching jobs have dropped during the 1980s, to the point where workers who changed jobs every other year had almost the same earnings after 10 years as those who had kept their jobs for 10 years.[36]



Foundations for Future Growth

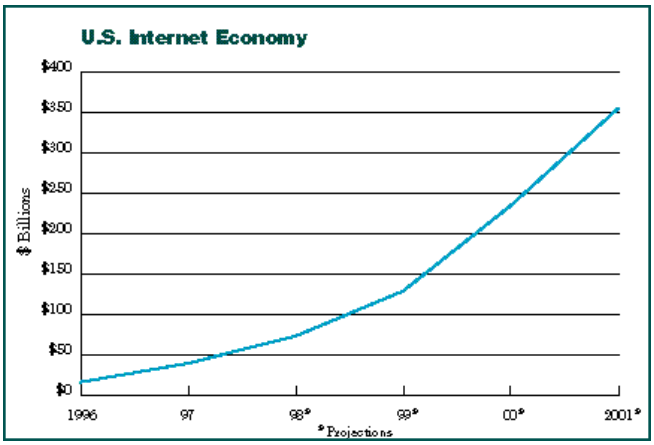
While the goals are still the same in the New Economy (e.g., increasing incomes, full employment), the means to achieve them have changed. PPI believes that three main foundations will underpin strong and widely-shared economic growth in the New Economy: development of a ubiquitous digital economy, increased research and innovation, and improved skills and knowledge of the workforce. The indicators in this section assess our progress in these areas. Each is marked with a trend line indicating positive (), negative (), or no progress ().

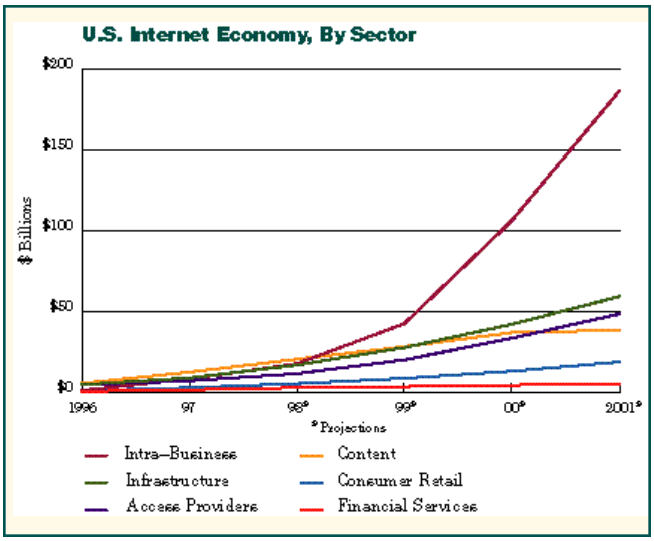
PROGRESS TOWARDS DIGITAL TRANSFORMATION

E-Commerce Takes Off

Why Is This Important? The Internet, with its enormous potential to increase efficiency and raise productivity, is a critical component of the New Economy. Internet commerce, which is arguably the most significant component of electronic commerce ("e-commerce"), includes consumer retail and business-to-business transactions; online financial services; media; infrastructure; and consumer and business Internet access services. In order to understand how the Internet will affect the New Economy, it is important to know both the Internet economy's total size and how that size is distributed.

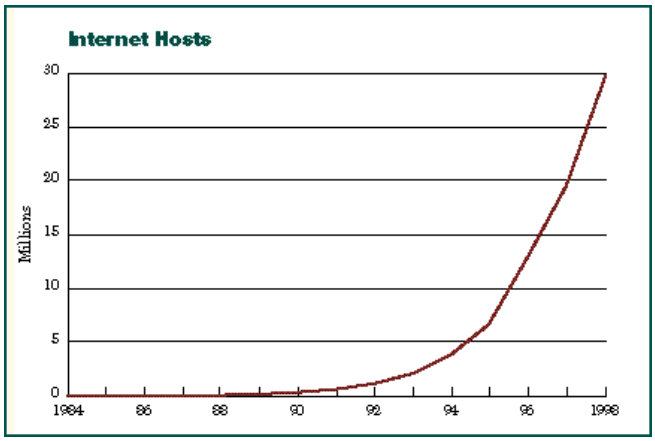
The Trend: The total U.S. Internet economy more than doubled between 1996 and 1997, from $15.5 billion to $38.8 billion. By 2001, the total U.S. Internet economy is projected to be over $350 billion. Business-to-business e-commerce is expected to account for the largest share, $186 billion. Consumer retail activity is expected to emerge more slowly, possibly totaling $18.4 billion in 2001.

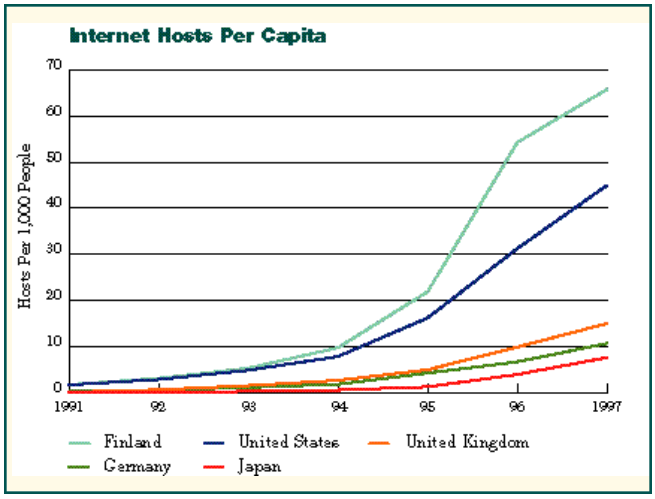




Business-to-business e-commerce is expected to account for the largest share of the Internet economy.

Mushrooming Internet Hosts





Why Is This Important? A "host" is a computer that acts as a source of information that can be obtained over the Internet. The total number of hosts is a valuable measure of Internet growth. It's the inverse of estimates of the number of people online: a measure of the value people can access online.

The Trend: Not surprisingly, there were few hosts until the early 1990s, at which point the number began to grow at an exponential pace, nearly doubling every year between 1990 and 1996. By July 1997, there were close to 20 million hosts, and by the end of January 1998, close to 30 million. On a hosts-per-capita basis, with the exception of Finland, the United States leads the world by a significant margin.

Serving up value on the Internet: On a hosts-per-capita basis, with the exception of Finland, the United States leads the world by a significant margin.

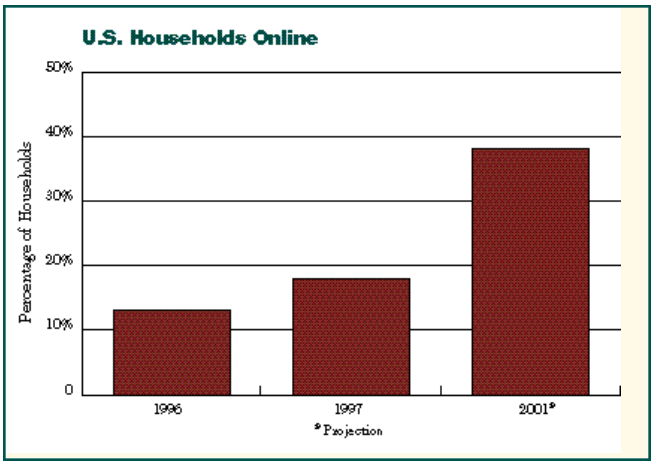
PROGRESS TOWARDS DIGITAL TRANSFORMATION

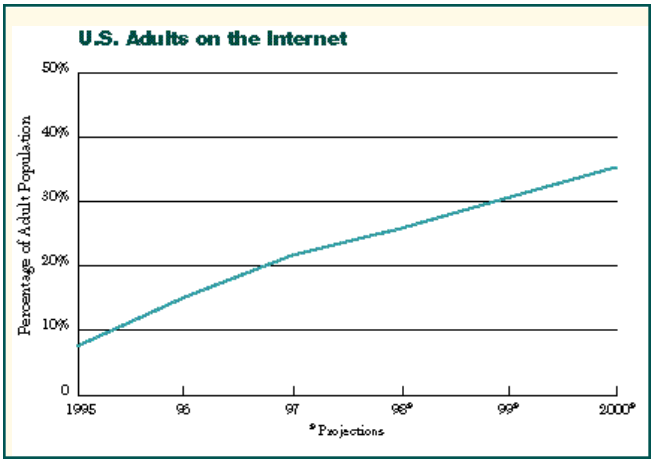
More Households on the Net

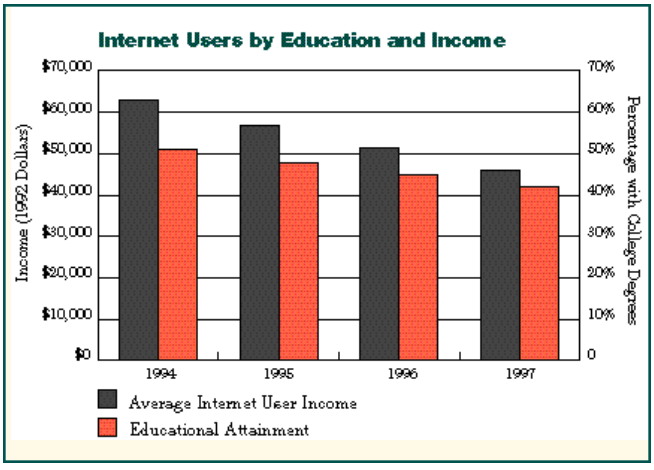
Why Is This Important? The number of people online is both a sign of the potential magnitude of electronic commerce, and an indication of our progress toward ubiquitous access to a range of online services, from health care to financial services to online governmental services.

The Trend: In 1996, 13 percent of American households were online. By 1997, 18 percent were online. The figure is projected to rise to 38 percent by 2001. The percentage of adults online has been slightly greater than the percentage of households online because many adults have access through their universities or work. From 1995 to 1997, the number of adult Internet users grew from 14.3 million to 41.5 million—from 7.5 percent of the adult population to nearly 22 percent. By the end of 2000, 72 million American adults are expected to be online—more than 35 percent of the adult population.

The speed of adoption of the Internet has been unprecedented. It will have taken the Internet less than seven years to be adopted by 30 percent of Americans, compared to 13 years for PCs, 17 for televisions, and 38 for telephones. And just like other major technologies, wealthier and more-educated consumers are the early adopters. However, as the technology becomes cheaper, a broader range of Americans are getting online. The average income of Internet users is dropping, as is the average education level. Both trends suggest that the online population is beginning to look more like the American population in general.[37]

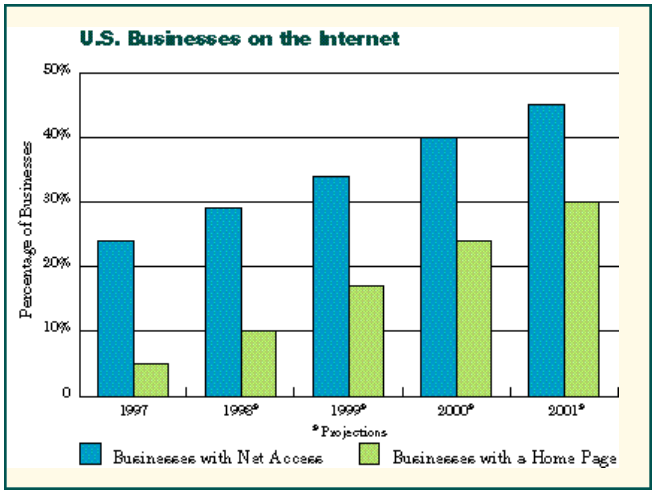






"It will have taken the Internet less than seven years to be adopted by 30 percent of Americans, compared to 13 years for PCs, 17 for televisions, and 38 for telephones."

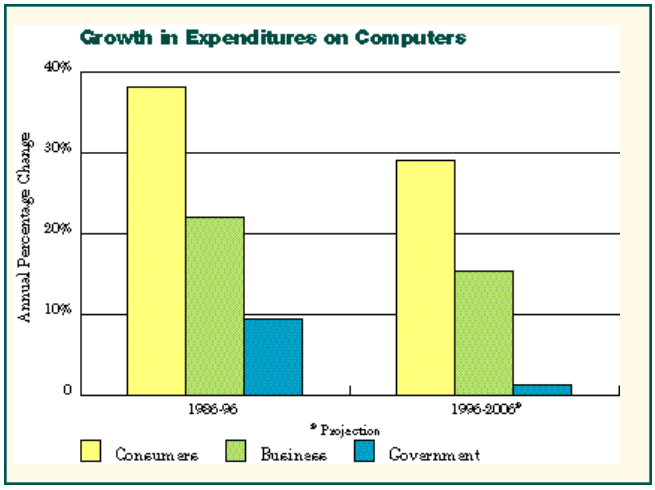
More Businesses on the Net



Why Is This Important? The Internet offers rewards of increased efficiency and access to customers that are too great for businesses to ignore. Sixty-five percent of purchasing managers recently surveyed said they use electronic ordering in one form or another, and that number was expected to grow to 85 percent by the end of 1998. Resulting efficiency improvements and increased competition should mean lower prices for consumers.

The Trend: In 1997, 24 percent of U.S. businesses had access to the Internet. That number is projected to grow steadily, to about 45 percent by the end of 2001. In the same period, the percentage of businesses with their own Web sites is projected to grow from 5 percent to 30 percent.

Government Lags Behind The Digital Revolution



Why Is This Important? Government can play a key role in advancing the digital economy by refocusing its procurement power and providing a potential critical mass of digital services, from smart cards for welfare recipients to online tax filing and voting. But this process must be intimately linked to reengineering government itself. One indicator of progress in this direction is expenditures by government on information technology.

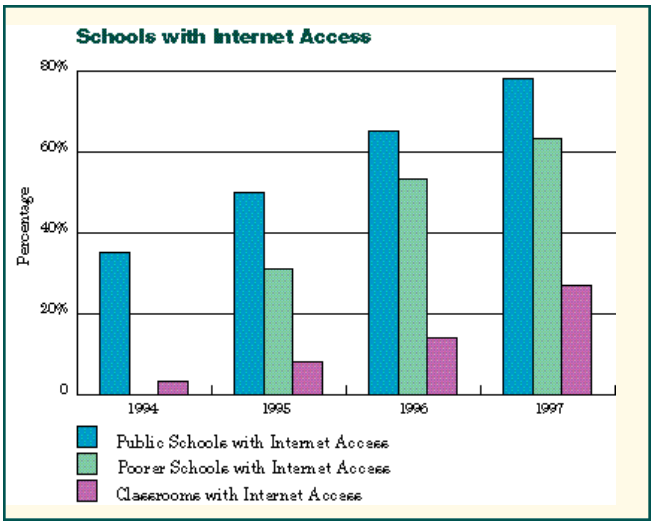
The Trend: Between 1986 and 1996, local, state, and federal government expenditures on computers increased 9.4 percent per year.[38] However, during the same period business computer purchases increased 22 percent per year, while consumer computer purchases increased 38 percent. In short, government failed to invest in information technology at the same rate as consumers and businesses, making it more difficult to cut costs and improve services. Even more disturbing, however, is that government purchases of computers are expected to increase at an annual rate of only 1.2 percent over the course of the next decade, 25 times slower than the rate of consumer purchases and 12 times slower than businesses. At this rate, digital government services will be a long time coming.

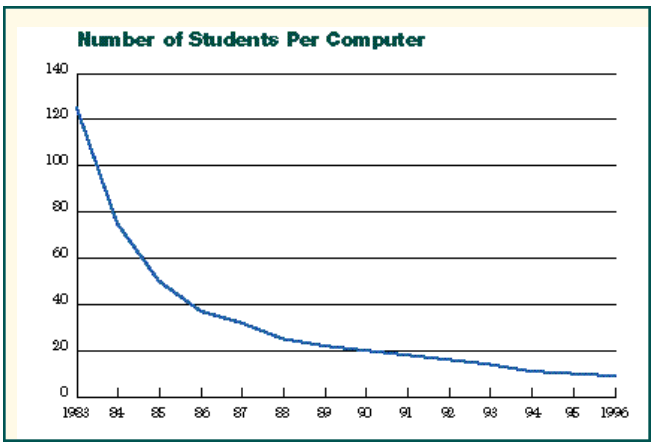
PROGRESS TOWARDS DIGITAL TRANSFORMATION

More Schools on the Net

Why Is This Important? It is not yet clear how, and to what degree, computers and the Internet should be integrated into K-12 curricula. PPI believes that the federal government must play a role in the process of evaluating the effectiveness of the various types of computer-based education.[39] But in the meantime, there is both real and symbolic value in wiring the nation's schools. Certainly the effort will accelerate our progress toward a digital information infrastructure.

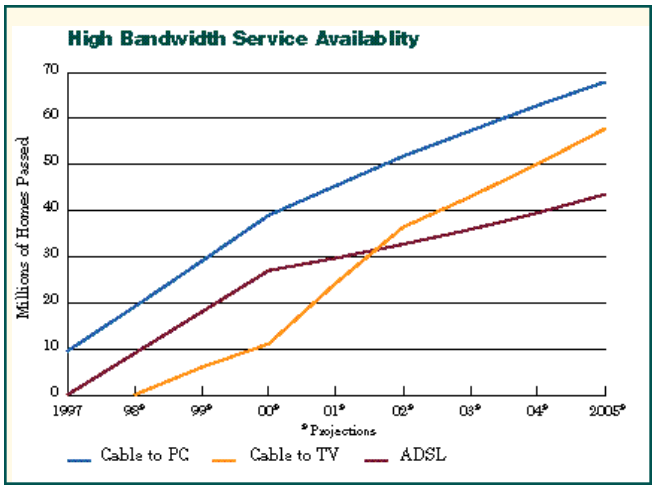
The Trend: The ratio of students per computer has been dropping steadily, from 123 to 1 in 1983, to 9 to 1 in 1996. However, many of these computers are old and slow and cannot access the Internet or use new software applications. In recent years, the percentage of schools with at least one Internet connection has increased rapidly, from 35 percent in 1994, to 78 percent in 1997. Poorer schools lag about a year or so behind other schools in adoption rates. The percentage of classrooms with Internet access has gone from 3 percent to 27 percent in the same period.

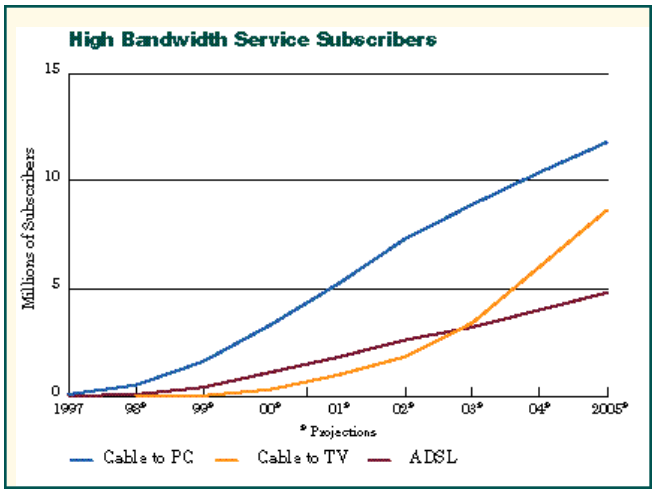




"The percentage of schools with at least one Internet connection has increased rapidly, from about 35 percent in 1994, to 78 percent in 1997."

The Bandwidth Buildout





Why Is This Important? The ability to transfer large amounts of data is largely determined by bandwidth, the carrying capacity of the connections, or the "size of the pipes," between the sender and receiver of the data. Greater bandwidth allows faster transmission of larger amounts of data, which in turn will facilitate not only the development of vastly more valuable and compelling online services, but also the convergence of all forms of electronic data transmission, from email and basic text documents, which require relatively little bandwidth, to full-motion, real-time video applications, which will require a great deal of carrying capacity. To determine our progress toward an information infrastructure where such services are feasible, it is important to look at the availability of high-bandwidth ("broadband") services.

The Trend: Broadband services have only recently begun to be deployed and they are still relatively expensive. Moreover, most people are still not on the Internet, and there are too few indispensable Internet applications requiring high bandwidth to make broadband services a necessity. These factors help explain why in 1997, while cable companies could claim nearly 10 million U.S. homes "passed" with services allowing high bandwidth Internet access over cable television wires, only somewhere in the neighborhood of 100,000 homes—approximately eight percent—actually subscribed. Similarly, by the end of 1998, some nine million homes are projected to have access to new asymmetric digital subscriber line (ADSL) services, which allow high-speed Internet connections over copper telephone lines, with 68,000 homes projected to subscribe. But by 2005, according to a conservative estimate, over five million homes are projected to subscribe to ADSL services and 14 million homes are expected to subscribe to cable services. Thus, within seven years, close to 20 million households in the United States—approximately 20 percent of all households—will likely have high-speed data capacity. And it's likely the numbers will be even higher. In the near future, most American consumers should have a choice of either cable or ADSL service available to them. Analysts at UBS Global Research project that the Regional Bell Operating Companies will have 22.2 million lines capable of supporting ADSL service by the end of 1998. Prudential Securities has estimated that total consumer subscriptions to high-speed services will reach 25 million in just the next four years.

Technology recently developed by Lucent transmits 3.2 terabits—which is approximately equal to 90,000 volumes of an encyclopedia—per second.

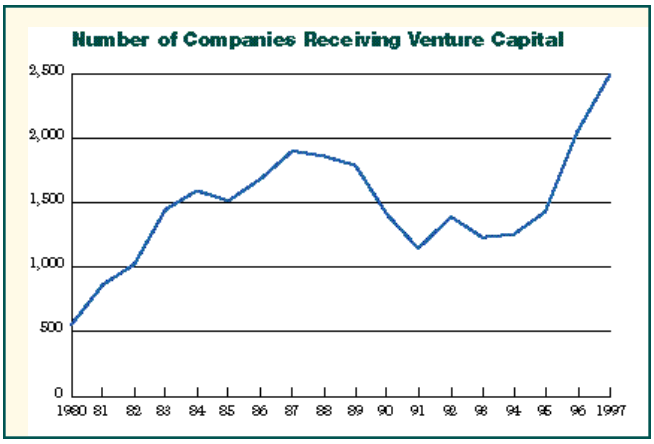
INVESTING IN INNOVATION

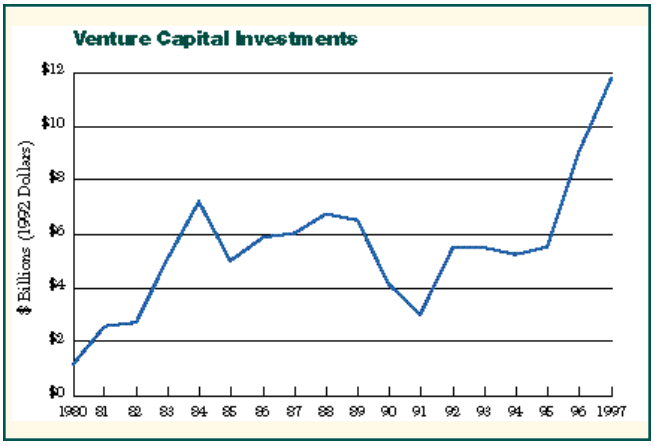
Venture Capital Investments Are Growing

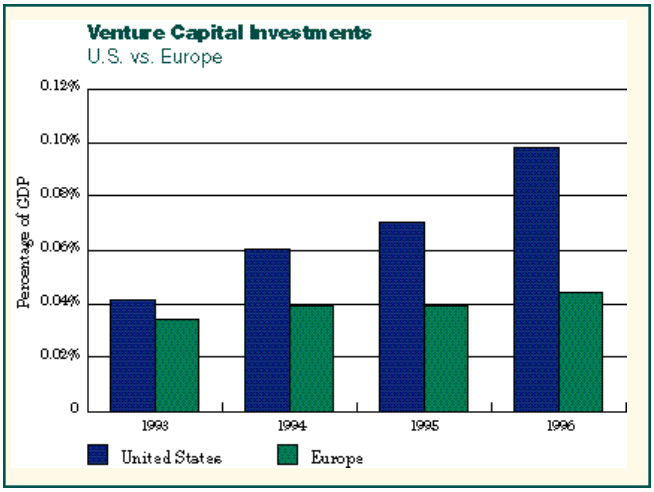
Why Is This Important? In relative terms, venture capital amounts to a small share of overall capital markets, but its value goes beyond a simple dollar figure. Venture capital spurs growth at the critical early stages of growing companies' development. Moreover, venture capitalists don't just throw their money at startup companies hoping to get lucky and pick a winner. They become involved as board members and management advisors, suggesting strategic partnerships and helping to refine business plans.

It's important to keep an eye on the straight dollar amount of venture capital in the economy, but it's just as important to remember the exponential ripple effect of the cash. Many of the gazelles of the New Economy are venture-backed companies, and they are having a profound impact—employment in venture-backed companies increased 34 percent annually between 1991 and 1995 while employment in Fortune 500 companies declined 3.6 percent. Moreover, venture-capital backed firms are more technologically innovative than other firms.[40]

The Trend: U.S. venture capital activity, which barely registered as a blip on the radar screen in the 1970s, hit a peak in the mid-1980s, and then a slump during the recession of the late 1980s and early 1990s. Since then it has rebounded, increasing from an average of $6 billion in the mid-1980s to $12 billion in 1997 (constant 1992 dollars) and from 0.10 percent of GDP to 0.16 percent of GDP. In 1997, it was disbursed to some 2,485 companies, five times more than in 1980. This is a real innovation advantage for the United States, which saw its venture capital activity grow twice as fast as European venture capital from 1993 to 1996 as a percentage of GDP.

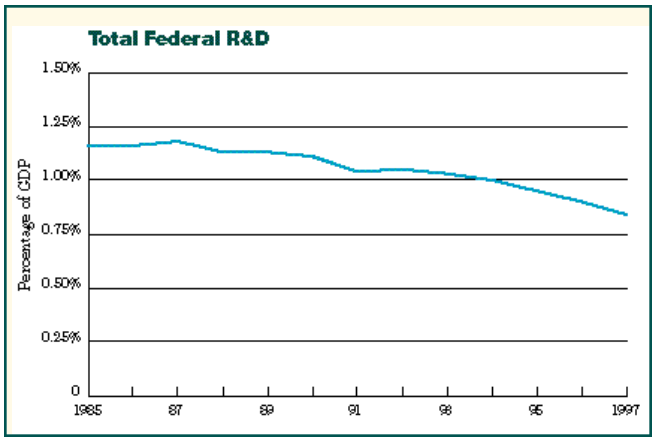


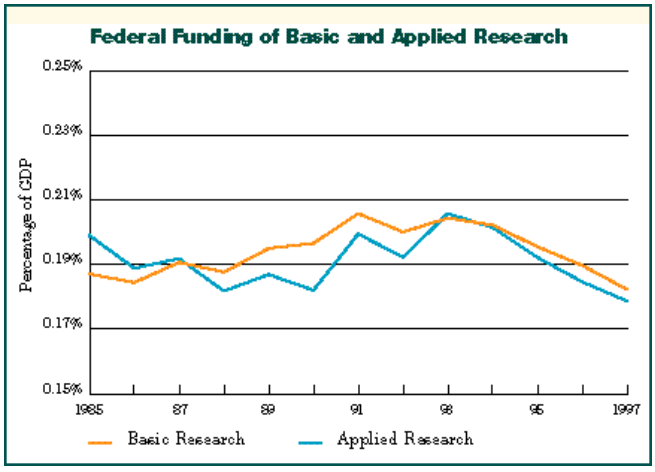


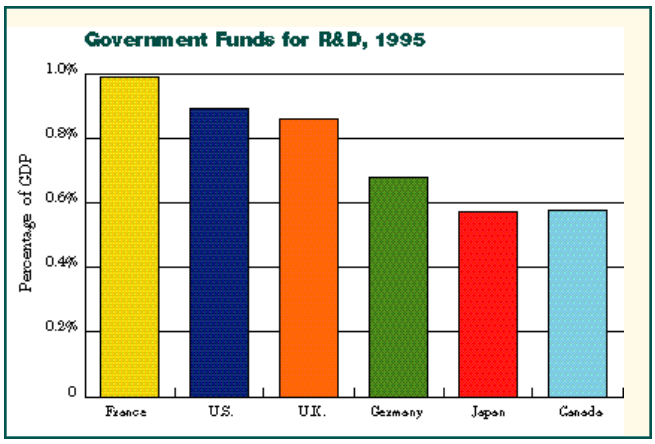


"Employment in venture-backed companies increased 34 percent annually between 1991 and 1995 while employment in Fortune 500 companies declined 3.6 percent."

Public R&D: A Key Public Investment Is Declining







Why Is This Important? Economists have shown that scientific and technological research is critical for economic growth, and that federal support for research has significant economic payoffs. Classic examples in terms of the New Economy have been the Internet and later the Web browser, which were both conceived and developed with government dollars and are now providing an entirely new realm for business opportunity.

The Trend: Federal support for non-defense R&D has been steadily dropping, from about 1 percent of GDP in the 1960s to less than half that percentage today (0.4 percent), and from 5.7 percent of the federal budget in 1965 to 1.9 percent in 1997. The decline is actually gaining steam, with all federal investments in research shrinking at an average annual rate of 2.6 percent in constant dollars between 1987 and 1995. Between 1993 and 1997, federal support for basic and applied research fell by 12 percent as a share of GDP. American investment in R&D relative to the size of its economy is lower than that of France and approximately equal to the U.K.

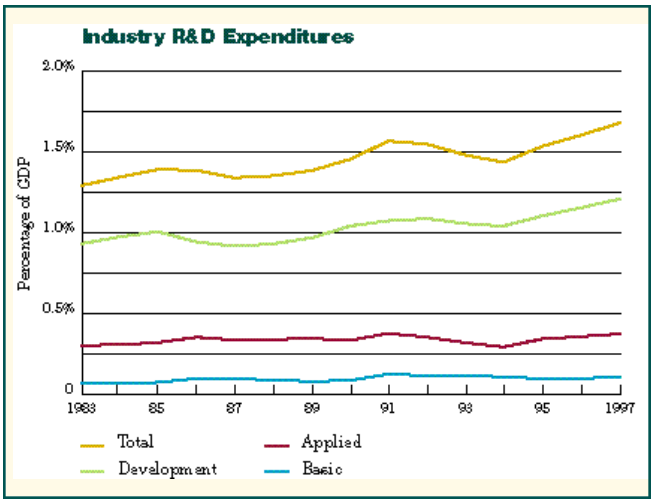
"The Internet and later the Web Browser, which were both conceived and developed with government dollars, are now providing an entirely new realm for business opportunity."

INVESTING IN INNOVATION

Private R&D Is Growing, But Basic Research Lags

Why Is This Important? R&D, which yields new product innovations and adds to the knowledge base of industry and the marketplace as a whole, is a key driver of economic growth—and business provides more than two-thirds of all R&D funding.

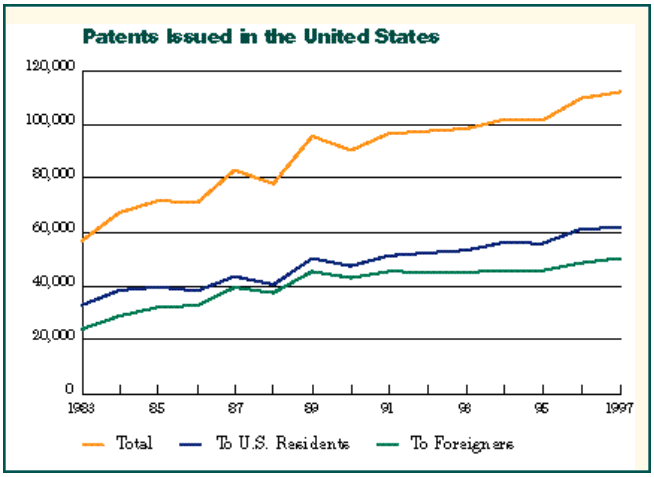
The Trend: After steadily rising in the 1980s, and falling in the early 1990s, business-funded R&D as a share of GDP has continued its upward climb, reaching its highest levels ever in 1997. However, as a share of GDP, company-funded basic research has declined slightly in this decade as competitive pressures and faster product cycles have led companies to shift their research more toward product development and process improvements. It is too early to tell whether this shift away from more risky exploratory research will limit innovation, but it does present cause for concern.



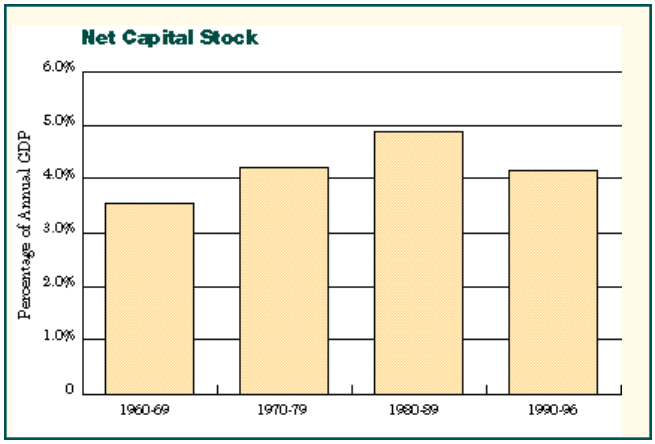
Patents Are Increasing

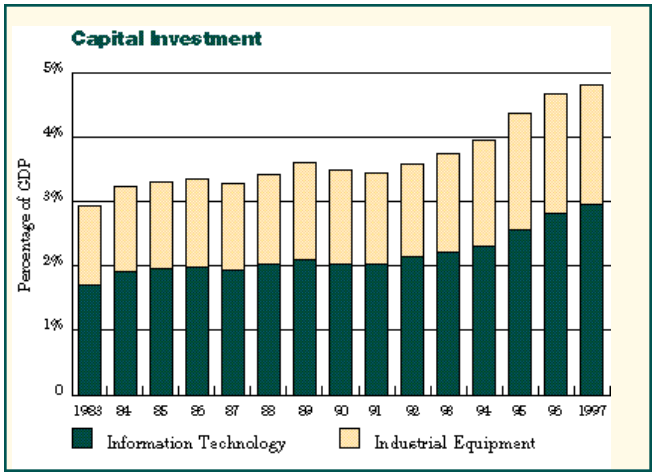
Why Is This Important? Research and technological innovation account for more than two-thirds of per capita economic growth.[41] One indicator of the rate of innovation is the number of patents issued.

The Trend: After reaching a peak in the mid-1970s, the number of patents issued per year in the United States declined until 1983. Since then, however, patents have increased consistently, almost doubling by 1997 when more than 110,000 patents were issued. Of patents issued in the United States, the share issued to foreign residents has risen from approximately 35 percent in 1975 to 45 percent in 1997. This is a considerably greater share than in Japan, where only 13 percent of all patents are issued to foreigners, but considerably less than in the U.K. (89.2 percent) or Germany (65.2 percent).



Investment Is Up, But Capital Stocks Are Down





Why Is This Important? Although knowledge generation is a key to driving economic growth, the size and quality of the nation's capital stock (e.g., machines, equipment), particularly information technology, is the critical determinant of productivity and real wage advance.[42] Moreover, it is through the acquisition of new generations of equipment that technological innovations are spread throughout the economy.

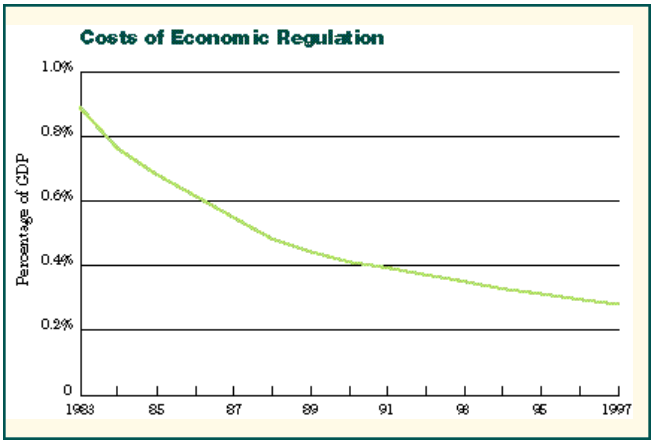
The Trend: Business investment in new equipment as a share of GDP has grown significantly in the 1990s, increasing more than 40 percent from the late 1980s. However, there is a difference between investment (the amount of money spent per year) and capital stocks (the total value of capital equipment in any one year). Capital stocks have actually declined in the 1990s, from about 5.3 percent of GDP in the 1980s to approximately 4.2 percent in the 1990s. It's not entirely clear why the value of capital stock is going down while investments are up, but one reason is certainly that an increasing share of investment is now in information technology, which devalues quickly. For example, approximately 60 percent of corporate information technology budgets go toward replacement of outdated equipment and product upgrades.[43]

"Business investment in new equipment has grown significantly, yet capital stocks have declined from about 5.3 percent of GDP in the 1980s to approximately 4.2 percent of GDP in the 1990s."

The Costs Imposed By Economic Regulation Are Falling

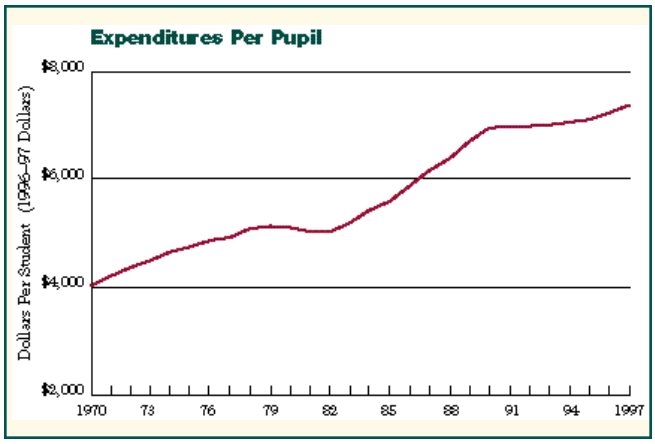
Why Is This Important? In fast-moving, innovation-based markets, some forms of economic regulation place an undue drag on economic growth. Moreover, the rapid pace of change makes it less likely that government can adapt economic regulations fast enough. For example, the delay of the FCC in licensing cellular telephones in 1982 is estimated to have cost the U.S. economy $83 billion.[44] New Economy factors have not reduced the need for environmental or social regulation (e.g., worker safety or pollution control), but they have allowed regulation to be more flexible and supportive of innovation.

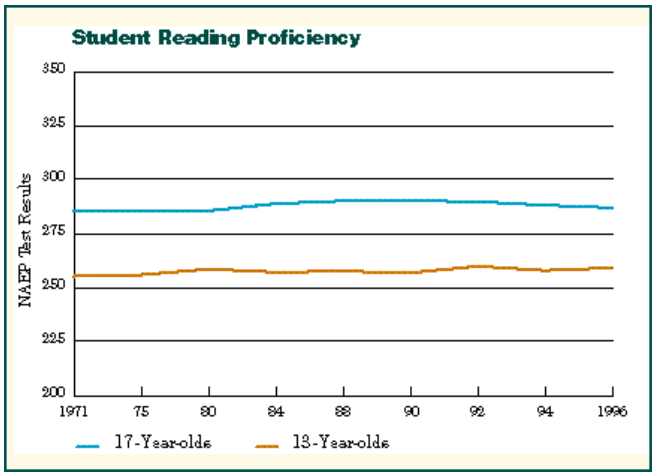
The Trend: Between 1983 and 1997, the inefficiency costs of economic regulation borne by both industry and consumers have fallen almost 70 percent as a share of GDP. The deregulation of transportation, (including trucking and airlines), natural gas and oil, financial services, and telecommunications has meant that, on net, competition and innovation have saved American consumers billions of dollars. However, the costs of regulation still remain high (between $71 billion and $223 billion, depending on the estimate used), suggesting that further economic deregulation (of electric and gas utilities, for example) could produce further benefits.

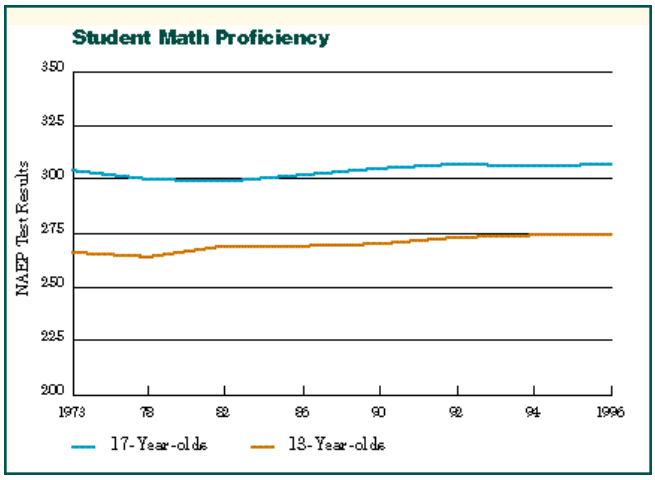


"Between 1983 and 1997, the innefficiency costs of economic regulation borne by both industry and consumers have fallen almost 70 percent as a share of GDP."

Student Math and Reading Abilities Remain Stagnant

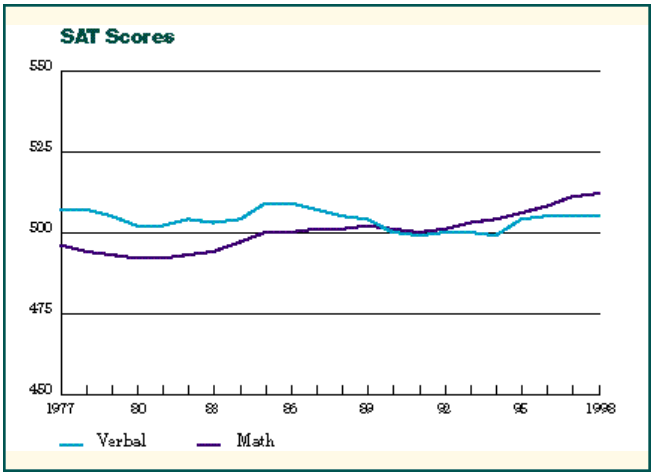


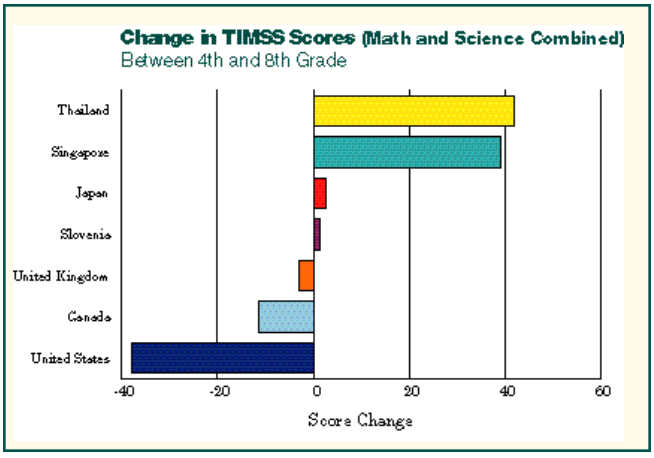




Why Is This Important? K-12 schools play a fundamental role in educating our workforce and their importance will only increase as the economy becomes more dependent on increased skills and education. One measure of their effectiveness is the performance of students on standardized tests.

The Trend: Student performance on tests of verbal and reading skills has either remained stagnant or has decreased slightly since the early 1980s. Performance on math tests has increased modestly. But as American students go through school, they fall further behind their foreign counterparts in both math and science. Between the 4th and 8th grade, U.S. students lost almost 40 points on the Third International Math and Science Study (TIMSS). In comparison, most other nations either lost only a few points, or in some cases, such as Thailand and Singapore, gained significant ground. Lack of funding does not appear to be the cause of poor performance, as per-pupil funding for K-12 public schools in the United States has almost doubled in the last 30 years.





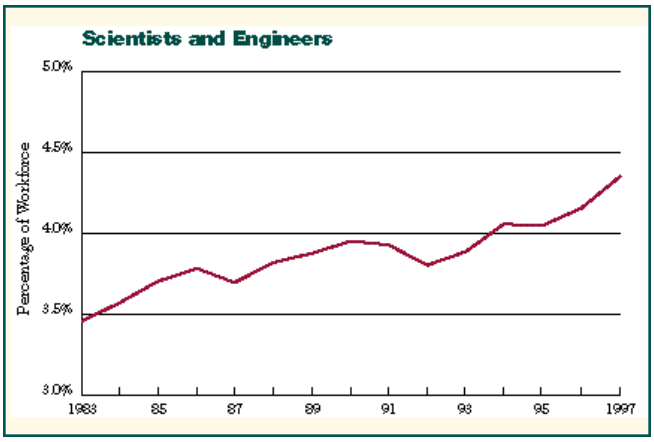
FOSTERING NEW ECONOMIC SKILLS

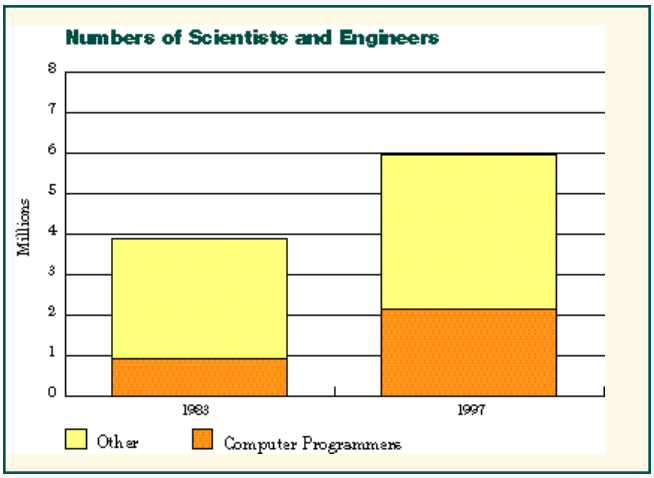
The Numbers of Engineers and Scientists Are Growing

Why Is This Important? Technological innovation is one of the key drivers of overall economic progress, and it is fueled by a strong engineering and scientific workforce.

The Trend: As a share of the workforce, scientists and engineers grew moderately throughout the 1980s, and even faster since 1993. But because jobs requiring science and engineering expertise are forecast to increase three times faster than other occupations between 1994 and 2005, the demand for scientists and engineers is expected to exceed supply by approximately four percent. Much of this increase has been driven by a rapidly growing demand for computer scientists and programmers, who increased as a share of all scientists and engineers from 23 percent in 1983 to 36 percent in 1997.

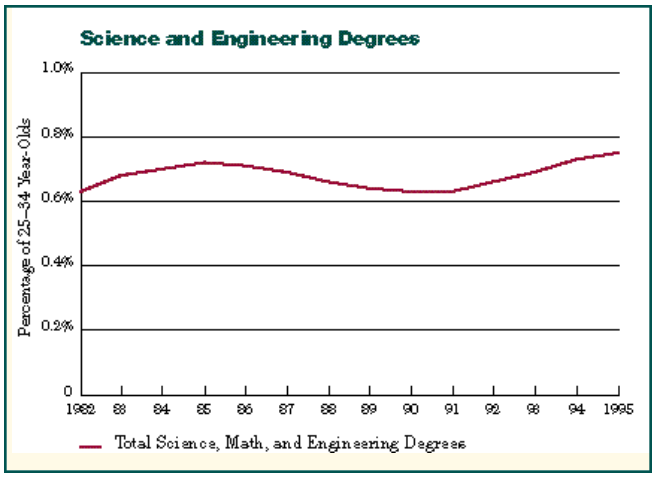
Foreign-born scientists and engineers are also becoming a more valuable part of our economy. The numbers of immigrant scientists and engineers admitted with permanent visas to meet growing industry demand has doubled from 0.3 percent of the science and engineering workforce in 1988 to 0.6 percent in 1993. Similarly, while only 1.3 percent of all Ph.D. scientists and engineers in the United States who have had a degree for more than 25 years are foreign born, almost one-quarter (24.3 percent) of those who earned their degrees in the last five years are foreign born.

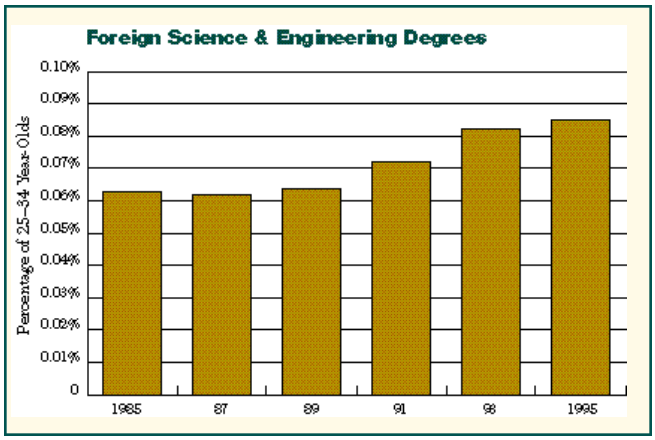




"Jobs requiring science or engineering expertise are forecast to increase three times faster than other occupations between 1994 and 2005."

Science And Engineering Degrees On Rise In Early 1990's





Why Is This Important? In the New Economy, the key engines of growth—technology and research-based companies and industries—are fueled by a large and high-caliber scientific and engineering workforce. Ensuring a growing and high-quality scientific workforce will be critical to continued economic growth in the next century.

The Trend: After falling in the late 1980s, the number of people getting science and engineering degrees has grown as a share of the population. One contributing factor is that foreign students, who remain a modest fraction of all science and engineering degree holders, are earning a significant and growing share of graduate degrees in some scientific and technical fields. For example, foreign students earned 35 percent of the master's degrees in computer science and 33 percent of those in engineering in 1993, up from 11 percent and 22 percent, respectively, in these fields in 1977.

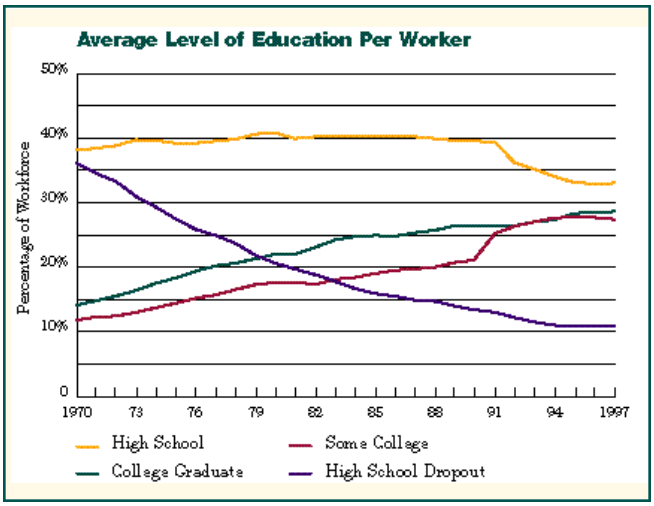
"Foreign students earned 35 percent of the masters' degrees in computer science and 33 percent of those in engineering in 1993, up from 11 percent and 22 percent, respectively, in 1977."

FOSTERING NEW ECONOMIC SKILLS

Workers Are Becoming Better Educated, But The Pace Of Improvement Has Slowed

Why Is This Important? In the New Economy, which puts a premium on speed, flexibility, and innovation, educational attainment increasingly determines both the opportunities and rewards for individuals. An educated workforce is critical to increasing per capita incomes and reducing income inequality.

The Trend: The share of the workforce with less than a high school education has declined from over 35 percent in 1970 to less than 11 percent now, though the pace of decline has slowed in the 1990s. An increasing share of the workforce that once only finished high school is now going on for more education, either at a four-year college or a two-year community college. While the share of workers finishing college has continued to increase, in the 1990s, its increase has slowed, in part because of the continued increase in the real cost of higher education. This slow-down, coupled with a more rapid increase in the share of jobs requiring a college degree, is one factor contributing to the increased wage gap between college-educated workers and those with less than a college degree.



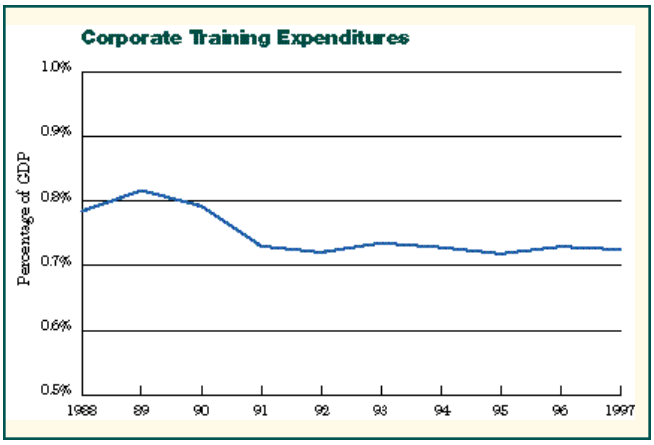
Corporate Expenditures On Training Have Slightly Declined

Why Is This Important? Old hierarchical, boundary-laden, and static organizational structures (in both business and government) are giving way to a new kind of "learning" organization with flattened hierarchies. This includes more decision-making and problem-solving authority in the hands of front-line employees; self-managed, cross-functional teams replacing bureaucratic "assembly lines;" and extensive cross-training, teamwork, and flexible work assignments replacing elaborate work rules. More than half of the largest corporations introduced new work designs in the early 1990s.

These broader work assignments require more skills and training. But while employment stability in the old economy gave workers the opportunity to learn new skills on the job and move up within the company, increased competitive pressures coupled with reduced employment tenure makes it harder for companies to justify training investments. Moreover, small firms spend a third less per employee on training than large firms, suggesting that initiatives such as industry-led Regional Skills Alliances are needed.[45]

The Trend: Corporate training appears to have increased in the 1980s. The share of workers who received skills training while on the job increased from 35 percent in 1983 to 41 percent in 1991,[46] but the length of training provided by employers declined substantially.[47] But since 1988, corporate training budgets as a share of GDP have declined slightly, to about 0.7 percent of GDP, or $58.6 billion.

Training is more prevalent among highly-educated workers than other workers: 61 percent of college-educated workers participated in on-the-job training in 1991, compared to 22 percent of workers with a high school degree. This may be in part because more-educated workers are in greater need of training to perform more complex jobs.



Almost everyone now agrees that the U.S. economy has undergone fundamental changes in the last 15 years, whether or not they refer to these changes as constituting a New Economy. However, too often the discussion on either end of the political spectrum has been driven by inaccurate assessments and selective choices of data—in short, by New Economy myths.

For many on the left, the New Economy represents a new threat to economic justice and social cohesion. These New Economy pessimists emphasize—and exaggerate—the down sides of the New Economy, while underestimating the benefits. They blame technology and globalization for downsizing, stagnant wages, growing inequality, and environmental degradation. Sometimes this leads to internally contradictory positions. They claim that if companies install technology, workers are laid off, but if companies don't install technology, they are milking profits and not reinvesting to raise wages. Pessimists correctly point out that economic change creates losers as well as winners, but their preferred solution is too often to slow or stop the processes of change. Thus, they prescribe trade protection, top-down regulation, and spending on outdated industrial-era bureaucratic programs. Their "land of milk and honey" is made up of large organizations with stable employment, stable markets, and stable competition, which are unrealistic expectations in the context of the fundamental trends in the New Economy.

For many on the right, the dawn of a digital era automatically means the twilight of government. These New Economy optimists emphasize—and exaggerate—the upsides of the New Economy, while overlooking its problems. While viewing it correctly as an era with great possibilities for growth and creativity, some on the right seek the elimination of virtually all regulation of technology, oppose government funding of research and development (excluding defense), and argue that government should simply "get out of the way," a stance that leaves Americans to fend for themselves during a difficult, often wrenching transition. Their "land of milk and honey" is made up of small firms and individual entrepreneurs in dynamic markets; higher income inequality that encourages hard work; a vastly reduced role for government, including reduced roles in technology, education, and skill development; and little effort to expand the winner's circle so that all Americans share in the benefits.

New Economy Pessimists' Myths:

Myth #1: **The New Economy has facilitated the dramatic deindustrialization of America.**

Reality: *Manufacturing has not disappeared, it has been reinvented.*

Between 1987 and 1996, inflation-adjusted manufacturing output in the United States increased 27 percent. But because of investments in technology, training, and new forms of work organization, U.S. firms were able to improve productivity even faster, which meant that manufacturing employment declined by only 1.4 percent.

Myth #2: **In the New Economy, globalization and corporate greed have combined to produce stagnant wages for most American workers.**

Reality: *Slow growth in real wages is a result of slow growth in economy-wide productivity.*

While income inequality is linked to technological change, immigration, and the decline of unionism, total wage income in the economy is tied to productivity growth. From 1963 to 1973, business productivity grew 35 percent while wages grew 31 percent. Between 1985 and 1995, productivity grew 9 percent, while wages grew only 6 percent.[48] Without faster productivity growth, faster wage growth is impossible. Some argue that wages have stagnated because corporate profits grew. In fact, if all of the increase in the share of national income going to corporate dividends went instead to wages, the latter would have increased only marginally faster between 1978 and 1997—20 percent instead of 16 percent.

Myth #3: **In the New Economy, most new jobs are low-wage jobs.**

Reality: *Low-wage jobs are growing, but higher-wage jobs are growing even faster.*

Between 1989 and 1998, high-paying jobs grew 20 percent, while low-paying jobs grew 10 percent. Middle-paying jobs showed no growth.

Myth #4: **Technological change kills more jobs than it creates.**

Reality: *Technology changes the composition of jobs and raises productivity and incomes, but it does not raise the natural rate of unemployment. On the contrary, the dynamic New Economy has reduced unemployment rates to a 25 year low.*

New technologies (e.g., tractors, disease resistant crops, etc.) spurred the decline in agricultural jobs. However, as food became cheaper (American consumers spend less of their income on food than any other nation) consumers spent their increased real income on other things (e.g., cars, appliances, entertainment), creating employment in other sectors. The 30-year low for unemployment after the wave of corporate downsizing and technology introduction makes it clear that technology doesn't reduce the total number of jobs in the economy. As new information technologies begin to raise productivity growth rates, this same positive dynamic will continue, leading to higher incomes, not fewer jobs.

Myth #5: **Corporate reengineering has meant the downsizing of large numbers of middle class, managerial jobs.**

Reality: *In the last nine years, three million new managerial jobs have been added (14.8 million in 1989 to 18 million in 1998).*[49]

Despite the fact that New Economy organizations flatten hierarchies, the New Economy spurs greater demand for more managers who focus on quality, innovation, design, marketing, and finance.

New Economy Optimist's Myths:

Myth #1: **The U.S. economy is in the midst of unprecedented economic boom that began in the early 1980s.**

Reality: *Growth in per capita GDP, productivity, and wages since the 1980s have lagged behind growth rates in the 1960s and early 1970s.*

While job growth was stronger in the 1980s and 1990s than in the 1960s and 1970s, productivity and per-capita GDP grew about half as fast.

Myth #2: **Income inequality is not a serious problem.**

Reality: *Between 1980 and 1996, real incomes went up 58 percent for the wealthiest 5 percent of American households, but less than 4 percent for the lowest 60 percent.*

Household income inequality has increased and has made it more difficult for many Americans to achieve the American dream. The strength of America's economy has historically been that most Americans have felt that they can prosper if they get an education, work hard, and play by the rules. If this compact is broken, our social fabric will start to disintegrate.

Myth #3: **The dispersing tendencies of the New Economy mean the death of large corporations and the twilight of government.**

Reality: *Large corporations and government are reinventing themselves and still play key roles in the economy, to say the least.*

Because information technology lets firms reach larger markets and take advantage of economies of scale, the average size of firms in the New Economy is growing, not shrinking. Moreover, just as the Internet did not mean the end of large companies like IBM, it also does not bode the end of government. Rather, it creates a requirement that governments re-engineer themselves to be faster, more flexible, and smarter.

Myth #4: **In the New Economy, a significantly growing share of the workforce are self-employed entrepreneurs.**

Reality: *Entrepreneurs represent about the same share of the workforce as ever.*

Between 1975 and 1994, self-employment as a share of total employment remained level at approximately 8.7 percent (10.6 million workers)—an all-time low.

Page 9 Indicator: More People Work in Offices and Provide Services.
Sources: Sectoral employment and output: President's Council of Economic Advisors, *Economic Report of the President, February 1998* (Washington, DC: 1998). High-tech output: American Electronics Association, *Cybernation: The Importance of the High-Technology Industry to the American Economy* (Washington, DC: 1997). Employment by type of work: Anthony Carnevale and Stephen J. Rose, *Education For What? The New Office Economy* (Princeton, NJ: Educational Testing Service, 1998).

Page 10 Indicator: High-Wage, High-Skill Jobs Have Grown, But So Have Low-Wage, Low-Skill Jobs.
Sources: An analysis of Bureau of Labor Statistics (BLS) occupational projections and training data was conducted by Ken Voytek, the chief economist of the National Alliance of Business. Job classification data: Carnevale and Rose. Job growth by wage category: Randy E. Ilg, "The Nature of Employment Growth, 1989-95," Bureau of Labor Statistics, *Monthly Labor Review*, vol. 119, no. 6 (http://www.bls.gov/opub/mlr/1996/06/contents.htm, June 1996).

Page 11 Indicator: Trade Is an Increasing Share of the New Economy.
Source: *Economic Report of the President, February 1998*. The sum of each year's imports and exports in constant 1992 dollars have been graphed as a percentage of that year's GDP.

Page 12 Indicator: Foreign Direct Investment Is on The Rise Around The World.
Source: Organization for Economic Co-Operation and Development, *Reviews of Foreign Direct Investment-United States* (Paris: OECD, 1995).

Page 13 Indicator: The Economy Is Spawning New, Fast-growing, Entrepreneurial Companies.
Source: David Birch, Anne Haggerty, and William Parsons, *Corporate Demographics: Who's Creating Jobs* (Cambridge, MA: Cognetics, 1997).

Page 14 Indicator: Businesses Face More Competition.
Source: U.S. Census Bureau, *County Business Patterns*, selected years.

Page 15 Indicator: "Coopetition:" Increasingly, Competitors Are Collaborating.
Source: National Science Foundation, *Science and Engineering Indicators, 1996* (Washington, DC: U.S. Government Printing Office, 1996), p. 158.

Page 15 Indicator: The New Economy Is Constantly Churning.
Source: United States Census Bureau (http://www.census.gov/pub/epcd/ssel_tabs/view/tab9_99.html).

Page 16 Indicator: Consumer Choices Are Exploding.
Sources: The U.S. Patent and Trademark Office. Magazine data: Harrington Associates, LLC. Grocery data: Food Marketing Institute.

Page 17 Indicator: Speed Is Becoming the Standard.
Sources: Abbie Griffin, "PDMA Research on New Product Development Practices: Updating Trends and Benchmarking Best Practices," *Journal of Product Innovation Management*, vol. 14, no. 6 (November 1997), pp. 429-458. Albert Page, "Assessing New Product Development Practices and Performance: Establishing Crucial Norms," *Journal of Product Innovation Management*, vol. 10 no. 4 (September 1993), pp. 273-290 (as cited in Griffin).

Page 18 Indicator: Microchips Are Everywhere.
Source: VLSI Research (San Jose, California).

Page 18 Indicator: Computing Costs Are Plummeting.
Source: Integrated Circuit Engineering Corporation, using Intel Corporation's technical specifications and chip data.

Page 19 Indicator: Data Transmission Costs Are Plummeting.
Source: Probe Research (Cedar Knolls, New Jersey), Bellcore.

Page 21 Indicator: Productivity Growth Is Lagging.
Source: *Economic Report of the President, February 1998*.

Page 23 Indicator: The Growth of Earnings Inequality Has Slowed.
Sources: Household Income from Census Bureau, Current Population Survey (http://www.census.gov/hhes/income/histinc/h03.html). Hourly earnings inequality from Robert I. Lerman, "Reassessing Trends in U.S. Earnings Inequality," *Monthly Labor Review*, December 1997, pp. 17-25. The figure shows the trend in the ratio of the income of the highest 10 percent of wage earners to the lowest 10 percent. The CPS line uses data from the Census Bureau's Current Population Survey. The SIPP line uses data from the Census Bureau's Survey of Income and Program Participation.

Page 24 Indicator: Fewer Workers Are Unemployed or Under-employed.
Source: U.S. Department of Labor, Bureau of Labor Statistics. Underemployed persons are defined as people working part time (one to 34 hours) due to economic reasons, as opposed to voluntarily choosing to work part-time. The graph shows the number of under-employed plus the number of unemployed as a percentage of total employment.

Page 24 Indicator: Worker Displacement Is Only Modestly Increasing.
Sources: Bureau of Labor Statistics. Also, William Baumol and Edward Wolff, "Speed of Technical Progress and Length of the Average Interjob Period," *Working Paper* no. 237, May 1998, The Jerome Levy Economics Institute of Bard College.

Page 25 Indicator: The Wage Premium for Skilled Jobs Is Growing.
Sources: U.S. Department of Labor, *Report on the American Workforce, 1997* (Washington, DC:1998). Anthony P. Carnevale and Stephen J. Rose, *Education for What: The New Office Economy*. The graph shows the average unemployment rate for workers with less than four years of high school divided by the average unemployment rate for workers with four years or more of college in the 1970s, 1980s and 1990s.

Page 26 Indicator: Employee Benefits Have Fallen.
Sources: Pension data are from the U.S. Department of Labor Pension and Welfare Benefits Administration. Health care data are Employee Benefit Research Institute estimates from 1988 through 1996 U.S. Census Bureau current population surveys.

Page 27 Indicator: Contingent Work Is Also Increasing Only Modestly.
Source: Richard Belous, "The Rise of the Contingent Work Force: Growth of Temporary, Part-Time and Subcontracted Employment," National Policy Institute, *Looking Ahead*, vol. 19, no. 1 (June 1997).

Page 27 Indicator: Workers Experience Less Job Stability.
Source: Bureau of Labor Statistics (http://stats.bls.gov/news.release/tenure.nws.htm).

Page 29 Indicator: E-Commerce to Take Off.
Source: Forrester Research (Cambridge, Massachusetts). Projections based on U.S. Census data (on the number of U.S. businesses) and surveys of Internet service providers.

Page 30 Indicator: Mushrooming Internet Hosts.
Source: Mark Lottor, Network Wizards (Menlo Park, California).

Page 31 Indicator: More Households On The Net.
Sources: Adults online: Cyber Dialogue, Inc. (New York). Households online: IDC/Link (New York). Demographics: Peter Clemente, *The State of the Net* (New York: McGraw Hill, 1998).

Page 32 Indicator: More Businesses On The Net.
Source: Forrester Research (Cambridge, Massachusetts) surveyed 81 Internet service providers of various sizes and focus areas and extrapolated to forecast the percentage of businesses that will be on the Internet in coming years.

Page 32 Indicator: Government Lags Behind the Digital Revolution.
Source: U.S. Department of Labor, Bureau of Labor Statistics, *Employment Outlook, 1996-2006: A Summary of BLS Projections* (Washington, DC: 1998).

Page 33 Indicator: More Schools On The Net.
Sources: Quality Education Data and the U.S. Department of Education.

Page 34 Indicator: The Bandwidth Buildout.
Source: Broadband market projections by Paul Kagen & Associates (Carmel, California).

Page 35 Indicator: Venture Capital Investments Are Growing.
Sources: U.S. statistics: The National Venture Capital Association *1997 Annual Report* (Arlington, VA: NVCA, 1998), prepared by Venture Economics (a division of Securities Data Company). United States-European comparative data: The Organization for Economic Cooperation and Development *Science, Technology and Industry Outlook, 1998* (Paris: OECD, 1998). The two sources' estimates vary.

Page 36 Indicator: Public R&D Is Declining.
Sources: U.S. data from the National Science Foundation, *Science and Engineering Indicators, 1996*. International data from OECD, *Science, Technology, and Industry Outlook, 1998*. All international figures in purchasing power parity funds.

Page 37 Indicator: Private R&D Is Growing, But Basic Research Lags.
Source: National Science Foundation, *National Patterns of R&D Resources 1997: Data Update* (http://www.nsf.gov/sbe/srs/natpat97/start.htm).

Page 37 Indicator: Patents Are Increasing.
Source: U.S. Patent and Trademark Office. Data are for utility patents.

Page 38 Indicator: Investment Is Up, But Capital Stocks Are Down.
Sources: U.S. Department of Commerce Bureau of Economic Analysis, Survey of Current Business, and *Economic Report of the President, February 1998.*

Page 39 Indicator: The Costs Imposed by Economic Regulation Are Falling.
Source: U.S. Small Business Administration, Office of the Chief Counsel for Advocacy, *The Changing Burden of Regulation, Paperwork, and Tax Compliance on Small Business: A Report to Congress,* (Washington, DC: SBA, October 1995), Table 3, p. 28.

Page 40 Indicator: Student Math And Reading Abilities Remain Stagnant.
Source: Student achievement data: National Center for Education Statistics, *Digest of Education Statistics 1997* (Washington, DC: U.S. Government Printing Office, 1997). IEA Third International Mathematics and Science Study (TIMSS), 1995-96.

Page 41 Indicator: Engineers and Scientists Are Growing as a Share of The Total Workforce.
Sources: Bureau of Labor Statistics. The graph shows the combined total of math, computer, and natural scientists, engineers, technicians, and computer programmers as a share of the total workforce. Data on doctoral scientists: P. Brown and P.H. Henderson, "Doctoral Scientists and Engineers in the United States: 1995 Profile" (Washington, DC: National Academy Press, 1998).

Page 42 Indicator: Science and Engineering Degrees Are on the Rise in the Early 1990s.
Source: National Science Foundation, *Science & Engineering Indicators, 1996.*

Page 43 Indicator: Workers Are Becoming Better Educated, but the Pace of Improvement Has Slowed.
Source: Anthony P. Canevale and Stephen J. Rose, Education for What: The New Office Economy.

Page 43 Indicator: Corporate Expenditures on Training Have Slightly Declined.
Source: *Training Magazine*, October 1997.

1. Bob Davis and David Wessel, *Prosperity: The Coming 20-Year Boom and What It Means to You* (New York: Random House,1998).
2. This report uses existing data to illustrate some of the changes that mark the fundamental transformation of the economy. However, the New Economy has made it an imperative that we revamp and modernize our economic statistics system, including how we measure ecomonic output and quality improvement. PPI will be releasing a paper addressing this issue and listing specific improvements that need to be made.
3. Remarks by Chairman Alan Greenspan at the Haas School of Business, University of California, Berkeley, September 4, 1998. (http://www.bog.frb.fed.us/boarddocs.speeches.19980904.htm)
4. One indicator of the lower level of competition is that the Japanese had the highest domestic mark-up ratios in manufacturing of all OECD nations, 75 percent higher than in the United States for the period from 1980 to 1992. OECD, *Science, Technology and Industry: Scoreboard of Indicators, 1997* (Paris: OECD,1997).
5. In 1995, the Japanese investment in information technology as a share of GDP is 55 percent of the U.S. level and as a share of total investment is even lower. OECD, Science, Technology, and Industry Outlook (Paris: OECD, 1998).
6. Japan's Deputy Minister of Posts and Telecommunications, Yoshio Utsumi, recently wrote: "Japan has not yet fully met the challenge of moving to an economy that is led by domestic consumption rather than a heavy reliance on exports; that bases business on strict cost-benefit analysis rather than personal ties; and, above all, that is dependent not on manufacturing but on knowledge and the skills of the information age." Yoshio Utsumi, "IT and Telecommunications in Japan's Economic Recovery," *Journal of Information Policy*, vol. 1, no. 2 (Vienna, VA: Silverberg Independent Media, September 1998), 11.
7. http://www.sec.gov/edgarhp.htm.
8. A similar set of Old and New Economy characteristics has also been developed by John Doer, of Kleiner, Perkins, Caulfield & Byers (Menlo Park, California).
9. Organization for Economic Cooperation and Development, *The Knowledge Economy* (Paris: OECD, 1996), 9.
10. Non-production jobs are growing in the manufacturing sector. In 1976, 32 percent of manufacturing workers worked in managerial, professional, sales, technical, or service jobs. Today, they account for over 40 percent of the sector.
11. Jane Frazer and Jeremy Oppenheim, "What's New About Globalization," *The McKinsey Quarterly*, no. 2 (1997): 172.
12. Service import and export data are not available in constant dollars before 1982.
13. Office of Management and Budget, *Budget of the United States Government: Analytical Perspectives, FY 1999* (Washington: U.S. Government Printing Office, 1998), 147.
14. Baruch Lev, "The Old Rules No Longer Apply," *Forbes ASAP* (April 7, 1997).
15. Martin Wolf, "The Bearable Lightness," *Financial Times* (August 12, 1998), (www.ft.com/hippocampus/79922).
16. Peter Cappelli, et. al, *Change and Work* (Washington, DC: National Policy Association, 1997).
17. Organization for Economic Cooperation and Development, *Science, Technology and Industry: Scoreboard of Indicators* (Paris: OECD, 1997), 70.
18. Ibid., 88.
19. Jane E. Fountain and Robert D. Atkinson, *Innovation, Social Capital, and the New Economy: New Federal Policies to Support Collaborative Research* (Washington, DC: Progressive Policy Institute, July 1998).
20. Regis McKenna, *Real Time: Preparing for the Age of the Never Satisfied Customer* (Boston: Harvard Business School Press, 1997).
21. Ibid.
22. Kristi Thiese, equity analyst, investment bank Raymond James & Associates.
23. Cappelli, op. cit.
24. President's Council of Economic Advisors, *Economic Report of the President* (February 1998).
25. Not all industries in the service sector have had slow productivity growth. For example, two of the industries that have seen the fastest productivity growth in the last 10 years, railroads and telecommunications, are in the service sector. Yet most of the other industries in the service sector have seen productivity growth rates well under 1 percent per year.
26. The Conference Board, *Perspectives on a Global Economy* (Washington, DC, 1998), 13.
27. Erik Brynjolfsson and Lorin Hitt, "Beyond the Productivity Paradox: Computers Are The Catalyst For Bigger Changes," *Communications of the ACM*, vol. 41, no. 8 (August 1998): 49-55.
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31. Stephen Herzenberg, John A. Alic and Howard Wial, *New Rules for a New Economy: Employment and Opportunity in Post-Industrial America* (Ithaca, NY: Cornell University Press, 1998).

32.Martha Walker and Bruce Bergman, "Analyzing Year-to-Year Changes in Employers' Costs for Employee Compensation" *Compensation and Working Conditions* (Spring 1998): 26.

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