

# Digital Economy 2002



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**THE SECRETARY OF COMMERCE**

Washington, D.C. 20230

I am pleased to release *Digital Economy 2002 (DE2002)*, the Commerce Department's fourth annual report on the impact of information technology (IT) on the structure and performance of the U.S. economy. In my view, reports like this one fulfill a core element of the Commerce mission by providing the data and analyses that help policy makers, business people, and private investors make better economic decisions. Events of the past year – a recession and the terrible events of September 11 – have made our task more challenging than ever and, if possible, even more important.

In recent days, the economy has shown welcome signs of imminent recovery. *DE2002* shows that the recovery, when it comes, will have a firm foundation. Despite the recession, businesses continued through 2001 to build stocks of IT capital. In addition, owing partly to continuing IT innovation and deployment, inflation has remained low, and productivity growth, breaking the pattern of every recession since 1950, has been positive.

*DE2002* also shows that the diffusion of information technology and the Internet have continued to expand opportunities for all Americans to communicate, shop, and learn. Today more than half of all Americans use the Internet; moreover, Internet use is increasing rapidly among all demographic, economic, and regional groups. At work and at home, IT and the Internet are swiftly becoming fixtures of our daily lives.

The IT revolution has been driven largely by private creativity and entrepreneurial courage. The American people's receptiveness to using and adapting new technology has also contributed to our success. However, achievement of the revolution's full potential will also demand skillful public action – to preserve the environment for continued innovation and investment, to enhance cyber security, to protect consumers and ensure respect for individual privacy, and to guarantee that all American businesses and all of America's people can participate freely, according to their own goals and talents, in the promise of the digital economy. On all sides, much remains to be done.

Donald L. Evans



# Executive Summary

The second half of 2000 marked a turning point in recent economic experience and gave new urgency to questions about the nature and durability of the new economy.<sup>1</sup> Answers to these questions should be clearer on the far side of the slowdown. For analysts standing in the hollow of the process, however, the challenge is still to assess developments in IT-producing and -using industries since mid-2000 and to determine what that experience suggests about the future.

*Digital Economy 2002* concludes that, despite an economic slowdown and recession, U.S. industries have continued to build the nation's IT capital stock, to marshal the human skills and IT services that make the installed base of IT capital more productive, and to create as a result the enduring foundation of a stronger economy.

## THE NEW ECONOMY— BATTERED BUT ENDURING

- Falling profits in a slowing economy have weakened business investment, including IT investment. Nonetheless, demand remains at remarkably high levels by historic standards. In the fourth quarter of 2001, U.S. businesses invested in IT equipment and software at an annual rate of \$408 billion, down 16 percent from the peak four quarters earlier. Because the gains throughout 2000 were so large and IT prices have been falling rapidly, real investment for all of 2001 was only 3 percent below

the level for 2000. As a result, U.S. businesses have continued at a diminished rate to build net stocks of IT processing equipment and software.<sup>2</sup>

- In 2000, the composition of business IT spending shifted toward products and services likely to result in more productive use of IT hardware (e.g., software and computer services). This trend continued in 2001; through the fourth quarter of the year, software spending declined slightly (at a 3-percent annual rate), but remained far stronger than other categories of IT investment spending.
- Employment patterns reflect the changes in business spending. Despite a 1.4 percent decline in the total private sector employment during 2001, employment grew by 0.5 percent in telecommunications services and 1.4 percent in computer software and services—industries whose outputs are likely to make the installed base of IT hardware more productive. IT-producing industries employed roughly 5.6 million workers in 2000 and paid twice the average private industry wage (\$73,800 compared with \$35,000).
- Only 18 percent of the acceleration in U.S. productivity growth between 1989-95 and 1995-2000 came from durable manufacturing industries (including semiconductors, computers, and communications equipment), with the remainder coming from IT-intensive industries<sup>3</sup> outside the durables sector and from industries that use IT less intensively. Of 55 industries in the U.S. nonfarm business sector, 30 contributed positively to productivity growth acceleration. Such dispersion of productivity

<sup>1</sup> We define the "new economy" as an economy in which IT and related investments drive higher rates of productivity growth. U.S. experience in the late-1990s suggests that new economies are capable of long periods of rapid output growth with low inflation and low unemployment. Events since July 2000 indicate that IT-related changes in the organization of production and the composition of employment also support atypically high rates of productivity growth in periods of economic slowdown.

<sup>2</sup> Net stock is the real value of installed capital minus depreciation plus new investment.

growth suggests that massive IT investments by U.S. industries are producing positive and enduring changes and in the nation's economic potential.

- IT-intensive industries have helped check inflation. Between 1989 and 2000, while inflation in less IT-intensive industries averaged 3.0 percent, inflation in the IT-intensive sector averaged only 1.3 percent. Overall inflation (net of food and energy price changes) during the period averaged 2.1 percent.
- During 1996-2000, when the economy grew by an average 4 percent annually, the IT-producing sector, which accounted for 7 percent of GDP (on average), grew by 21 percent a year (on average, in real terms), and was responsible for 28 percent of overall real economic growth.

#### **SOURCES OF CONTINUING UNCERTAINTY**

- Experience since the beginning of 2001 suggests that the dynamism of IT-producing industries is double-edged. During 2000, business investment in information processing equipment and software (calculated as an average of annualized quarterly rates) accounted for 37 percent of the growth in U.S. GDP. By contrast, in 2001—for the first time in a decade—reductions in business investment in IT equipment and software had a negative effect on economic growth.
- Investment aside, the IT sector retains a significant base of demand in the areas of business spending on current expenses, personal consumption, and government consumption. In 2000, when IT investment totaled \$466 billion, businesses spent another \$258 billion on expensed IT goods and services. In the same year, consumers paid \$121 billion for computers, peripherals, and software, and another \$44 billion for communications services; and

IT expenditures by governments at all levels totaled over \$20 billion.

- Though U.S. IT companies are widely seen as leaders in world markets, the United States in 2000 had a deficit in IT goods trade of \$88 billion. In an increasingly integrated global economy, however, trade alone is a misleading indicator of competitive strength. In 1998, for example, in the five IT industries for which affiliate data are reported, foreign sales by majority owned affiliates of U.S. IT companies totaled \$202 billion—almost twice the \$113 billion in comparable U.S. IT exports that year.
- While globalizing production, U.S. companies have kept high value-added functions at home. In three major IT-producing industries,<sup>4</sup> plants located in the United States produce on average more than three-quarters of the total value added by companies in the United States and the majority-owned foreign affiliates of U.S. companies.<sup>5</sup> U.S. jobs in these industries pay on average more than twice as much as jobs at foreign affiliates in the same industries.
- Private estimates indicate that the surge in “dot-com” failures that began in mid-2000, peaked in the first half of 2001 and has begun to subside. By one estimate, as much as 10 percent of the 7,000 to 10,000 “substantial” Internet companies that have received some formal venture funding closed their doors between January 2000 and December 2001. Through the middle of 2001, these failures, and staff cuts at surviving dot-com companies and the Internet divisions of primarily off-line companies had resulted in an estimated 135,000 layoffs.
- To date, the Internet as a commercial medium has disappointed initial expectations. E-commerce as a share of total U.S. retail sales remains at approximately 1 percent. At the industry level, reliance on e-commerce has been widespread but uneven. In 1999, the Internet or more traditional EDI transactions accounted for 12 percent of manufacturing shipments and 5.4 percent of sales by wholesale merchants.

<sup>3</sup> ESA economists ranked 55 two-digit SIC industries in the U.S. nonfarm business sector based on industry ratios of IT equipment stock to full-time employment (in 1996). Then they calculated each industry's average share of nominal GDP for the years 1989-2000. Reading top-to-bottom, they divided their ranked list of industries at the point where the sum of industry shares of GDP equaled 50 percent. For the analysis reflected in this bullet, they defined the 29 industries above the dividing line as “IT-intensive.”

<sup>4</sup> Computer and office equipment; household audio and video and communications equipment; and electronic components and accessories.

<sup>5</sup> Estimates based on 1998 Census annual survey data.

By contrast, e-commerce accounts for less than 1 percent of shipments among retailers and selected service providers.

### **THE FUTURE OF THE NEW ECONOMY**

In early 2000, Nobel Laureate Robert Solow observed that he would “feel better about the endurance of the [post-1995] productivity improvement after it survives its first recession.” On these terms, the acid test of the new economy is incomplete, but preliminary signs are encouraging. On each of the last eight occasions since 1950 when growth in nonfarm business output has turned negative for two consecutive quarters,

productivity growth has also turned negative. During the economic downturn of 2001, by contrast, productivity growth remained at a remarkably robust 1.9 percent, well above the U.S. norm for the period 1973-95 and almost matching the 1995-2000 period.

Continued strong productivity growth in a period of economic weakness suggests that U.S. industries are continuing to benefit from past and current investments in IT equipment, software and services, and related human skills. In effect, even as these industries continue to build the foundations of future U.S. economic strength, they are realizing the benefits of the new economy.





# Table of Contents

<b>PREFACE</b> .....	xiii
<b>CHAPTER I: SETTING THE STAGE: THE “NEW ECONOMY” ENDURES DESPITE REDUCED IT INVESTMENT</b> .....	1
Distress of IT-Producing Companies.....	1
Distress for IT Producers not Confined to U.S. ....	3
IT’s Expanding Role in the Economy .....	3
Prospects for IT Rebound in 2002.....	5
IT Supports a New Economy of Faster Productivity Gains.....	5
Conclusion.....	6
<b>CHAPTER II: THE EVOLVING ONLINE ENVIRONMENT</b> .....	9
Recent Changes .....	9
An Increasingly Networked World .....	15
Conclusion.....	21
<b>CHAPTER III: INFORMATION TECHNOLOGY INDUSTRIES IN THE NEW ECONOMY</b> .....	23
Output Growth in IT-Producing Industries and IT’s Relationship to the Economy at Large, 1996-2000 .....	24
Demand for IT Goods and Services Through the Third Quarter of 2001 .....	26
R&D Spending in the New Economy.....	30
Near-Term Prospects Clouded, Long-Term Prospects Encouraging .....	30
<b>CHAPTER IV: INDUSTRY-LEVEL EFFECTS OF INFORMATION TECHNOLOGY USE ON PRODUCTIVITY AND INFLATION</b> .....	31
Data and Methods .....	31
Major Findings .....	34
Conclusion.....	39
<b>CHAPTER V: JOBS IN THE NEW ECONOMY</b> .....	41
IT Workers: Demand and Supply.....	42
Information Technology’s Impact on Labor Markets.....	48
Conclusion.....	50
<b>CHAPTER VI: INTERNATIONAL SALES OF INFORMATION TECHNOLOGY GOODS AND SERVICES</b> .....	51
Trade in IT Manufactured Goods .....	52
Trade in IT Services .....	52
Trade Effects of the Globalization of Production and Distribution of IT Goods and Services.....	54
<b>CHAPTER VII: e-LEARNING: IMPACTS OF IT ON EDUCATION</b> .....	59
The Education Industry.....	59
Impacts of IT on Education .....	60
Impediments to E-Learning .....	63
<b>ACKNOWLEDGEMENTS</b> .....	65

## BOXES

<b>Box 3.1</b>	<i>Information Technology Producing Industries</i> .....	24
<b>Box 4.1</b>	<i>Computing an Individual Industry's Contribution to Overall Productivity Growth</i> .....	32
<b>Box 4.2</b>	<i>Comparing this Study with Other Recent Studies on IT's Role in U.S. Productivity Growth Acceleration</i> .....	33
<b>Box 5.1</b>	<i>IT-Related Jobs</i> .....	44
<b>Box 5.2</b>	<i>Specific Examples of Current and Planned IT Training Initiatives</i> .....	47

## FIGURES

<b>Figure 1.1</b>	<i>Net Cash Flow and Investment in Equipment and Software</i> .....	1
<b>Figure 1.2</b>	<i>Information Technology Production and Capacity</i> .....	2
<b>Figure 1.3</b>	<i>Shipments and New Orders, Information Technology</i> .....	2
<b>Figure 1.4</b>	<i>Inventories, Information Technology</i> .....	2
<b>Figure 1.5</b>	<i>Inventory/Sales, Information Technology</i> .....	3
<b>Figure 1.6</b>	<i>Exports and Imports of Information Technology</i> .....	3
<b>Figure 1.7</b>	<i>Investment in Information Processing Equipment and Software</i> .....	4
<b>Figure 1.8</b>	<i>Real Net Stock of Information Processing Equipment and Software</i> .....	4
<b>Figure 1.9</b>	<i>Information Processing Equipment and Software</i> .....	4
<b>Figure 1.10</b>	<i>Continued Strength in IT Service Jobs</i> .....	5
<b>Figure 1.11</b>	<i>Productivity in Nonfarm Business Sector</i> .....	5
<b>Figure 1.12</b>	<i>Change in Productivity Over Two Quarters</i> .....	6
<b>Figure 2.1</b>	<i>Monthly Internet Shutdowns</i> .....	10
<b>Figure 2.2</b>	<i>Amount Raised by Venture-Backed Companies</i> .....	11
<b>Figure 2.3</b>	<i>Equity Financing for Venture-Backed Companies by Internet and Non-Internet Businesses</i> .....	11
<b>Figure 2.4</b>	<i>Equity Financing for Venture-Backed Companies by Type of Internet Businesses</i> .....	12
<b>Figure 2.5</b>	<i>E-Commerce as a Percent of Total Value</i> .....	13
<b>Figure 2.6</b>	<i>Manufacturing Plants Use of Internet and EDI to Place and Accept Orders</i> .....	14
<b>Figure 2.7</b>	<i>Internet Use by Age</i> .....	16
<b>Figure 2.8</b>	<i>Internet Users as a Percent of the Population, European Union Countries and the United States</i> .....	16
<b>Figure 2.9</b>	<i>Online Activities as a Percent of the U.S. Population</i> .....	17
<b>Figure 2.10</b>	<i>Growth in Processing Power</i> .....	19
<b>Figure 2.11</b>	<i>Dramatic Declines in the Cost of Digital Data Storage</i> .....	20
<b>Figure 4.1</b>	<i>GDP Growth in Top-Half and Bottom-Half Industries and in All Industries of the U.S. Nonfarm Business Sector, 1989-2000</i> .....	36
<b>Figure 4.2</b>	<i>FTE Growth in Top-Half and Bottom-Half Industries and in All Industries of the U.S. Nonfarm Business Sector, 1989-2000</i> .....	36
<b>Figure 4.3</b>	<i>GDP per FTE Growth in Top-Half and Bottom-Half Industries and in All Industries of the U.S. Nonfarm Business Sector, 1989-2000</i> .....	36

<b>Figure 4.4</b>	Contributions to Overall GDP per FTE Growth by Top-Half and Bottom-Half Industries of the U.S. Nonfarm Business Sector, 1989-2000.....	37
<b>Figure 4.5</b>	GDP per FTE Growth in Top-Half and Bottom-Half Industries and in All Industries of the U.S. Nonfarm Business Sector, 1989-1995 and 1995-2000 .....	37
<b>Figure 4.6</b>	Contributions to Overall GDP per FTE Growth Acceleration by Top-Half and Bottom-Half Industries of the U.S. Nonfarm Business Sector, 1995-2000 over 1989-1995 .....	37
<b>Figure 4.7</b>	GDP per FTE Growth in U.S. Nonfarm Business Sector by Major Industry Groups, 1989-2000 .....	38
<b>Figure 4.8</b>	Contributions to GDP per FTE Growth in U.S. Nonfarm Business Sector by Major Industry Groups, 1989-2000 .....	38
<b>Figure 4.9</b>	GDP per FTE Growth in U.S. Nonfarm Business Sector by Major Industry Groups, 1989-1995 and 1995-2000 .....	39
<b>Figure 4.10</b>	Contributions to GDP per FTE Growth Acceleration in U.S. Nonfarm Business Sector by Major Industry Groups, 1995-2000 over 1989-1995 .....	39
<b>Figure 4.11</b>	Price Growth in Top-Half and Bottom-Half Industries and in All Industries of the U.S. Nonfarm Business Sector, 1989-2000 .....	39
<b>Figure 4.12</b>	Contributions to Overall Price Growth by Top-Half and Bottom-Half Industries in the U.S. Nonfarm Business Sector, 1989-2000 .....	39
<b>Figure 5.1</b>	Employment Growth: IT-Goods, IT-Services, and All Private Industries .....	42
<b>Figure 5.2</b>	Employment Levels: IT-Goods and IT-Services .....	42
<b>Figure 5.3</b>	Annual Wages per Worker: IT-Producing Industries and All Private Industries .....	43
<b>Figure 5.4</b>	Employment and Training Requirements of IT Occupations, 2000.....	45
<b>Figure 5.5</b>	Earnings Distribution Among IT Occupations, 2000 .....	45
<b>Figure 6.1</b>	U.S. Trade of IT Goods .....	51
<b>Figure 6.2</b>	U.S. Trade in Computer-Related Services .....	54
<b>Figure 6.3</b>	Foreign Sales of Majority-Owned Foreign Affiliates of U.S. IT Companies Compared to U.S. IT Exports .....	57

## TABLES

<b>Table 3.1</b>	IT-Producing Industries, by Sector: Gross Product Originating .....	25
<b>Table 3.2</b>	IT-Producing Industries, by Sector: Real GPO Growth .....	25
<b>Table 3.3</b>	Net Stocks of Information Processing Equipment and Software .....	26
<b>Table 3.4</b>	Contribution to Real Economic Growth .....	27
<b>Table 3.5</b>	Business Spending on Information Processing Equipment and Software: Contribution to GDP Growth.....	27
<b>Table 3.6</b>	Real Business Spending on Equipment and Software, 2000-2001.....	27
<b>Table 3.7</b>	Contribution of IT Equipment and Software to Growth in Capital Equipment and Software Spending.....	28
<b>Table 3.8</b>	Real Business Spending on Information Processing Equipment and Software, by Type.....	28
<b>Table 3.9</b>	Spending for IT Goods and Services, 2000 .....	29

<b>Table 3.10</b>	Company-Funded R&D Spending .....	29
<b>Table 4.1</b>	IT-Intensity Ranking by Ratio of Individual Industry ITEQ/FTE to Overall ITEQ/FTE, 1996, and Cumulative Sum of Average Shares of Nominal GDP, 1989-99 .....	35
<b>Table 5.1</b>	IT Occupational Employment, by Earnings and Skill Levels, 2000 .....	46
<b>Table 6.1</b>	U.S. Trade in IT Manufactured Goods.....	53
<b>Table 6.2</b>	U.S. Trade in IT Services.....	55
<b>Table 6.3</b>	U.S. IT Goods Trade Between Related Parties, 2000 .....	56
<b>Table 6.4</b>	World Trade in IT Goods, 1996 and 1999.....	56

NOTE: Methodologies, data sources and appendix tables referenced in the text of Digital Economy 2002 are available online at [www.esa.doc.gov](http://www.esa.doc.gov).

# Preface

**Kathleen B. Cooper**

*Under Secretary of Commerce for Economic Affairs*

*Digital Economy 2002 (DE2002)* is the Department's fourth annual report assessing the effects of information technology (IT) on U.S. economic performance. At bottom, each of these reports has addressed the same question—whether the integration of IT into our systems of production and distribution has created an economy that can achieve unusually high productivity growth well into the future. None of the four has answered this question conclusively. But *DE2002* comes the closest.

This year's report has faced new challenges. The question may be the same, but answers are more elusive. The slowdown that began mid-2000 and economic repercussions of the terrible events of September 11, 2001 have prompted additional skepticism about the new economy. This skepticism may be excessive—its expectations tied too closely to current experience. Until 18 months ago, IT enthusiasts probably oversold the promise of the new economy. Today, however, the opposite effect holds sway—encouraging a similar overselling of the contrary claim that the new economy never was.

In fact, the idea of the new economy was never a promise or even a hope that IT—like some reincarnation of 1960s fiscal policy fine-tuning—would make economic cycles obsolete. Rather it describes IT-related changes in the organization of production and distribution, and in the composition of employment, that lift the economy to a higher path of productivity growth—not only in periods of expansion such as the one enjoyed by the U.S. economy in the late 1990s, but also in periods of slowdown. Thus, by achieving atypically strong productivity growth since mid-2000, the U.S. economy may be showing us how new economies behave in a slowdown.

Two years ago, Nobel Laureate Robert Solow suggested that he would feel better about the improvement in productivity growth after it had survived its first recession. On these terms, the test of the new economy is incomplete. But, as *DE2002* shows, despite the economic difficulties and growing skepticism, the preliminary signs are encouraging.