



Portfolio Strategy Service

#27 10,000 In 2000

#28 Liquidity Story Is Wildly Bullish

#29 The Baby Boom Chart Book 1996

#30 Backlash: Workers Vs. Bonds

Topical Study #31

ECONOMIC CONSEQUENCES  
OF THE INTERNET

October 22, 1996

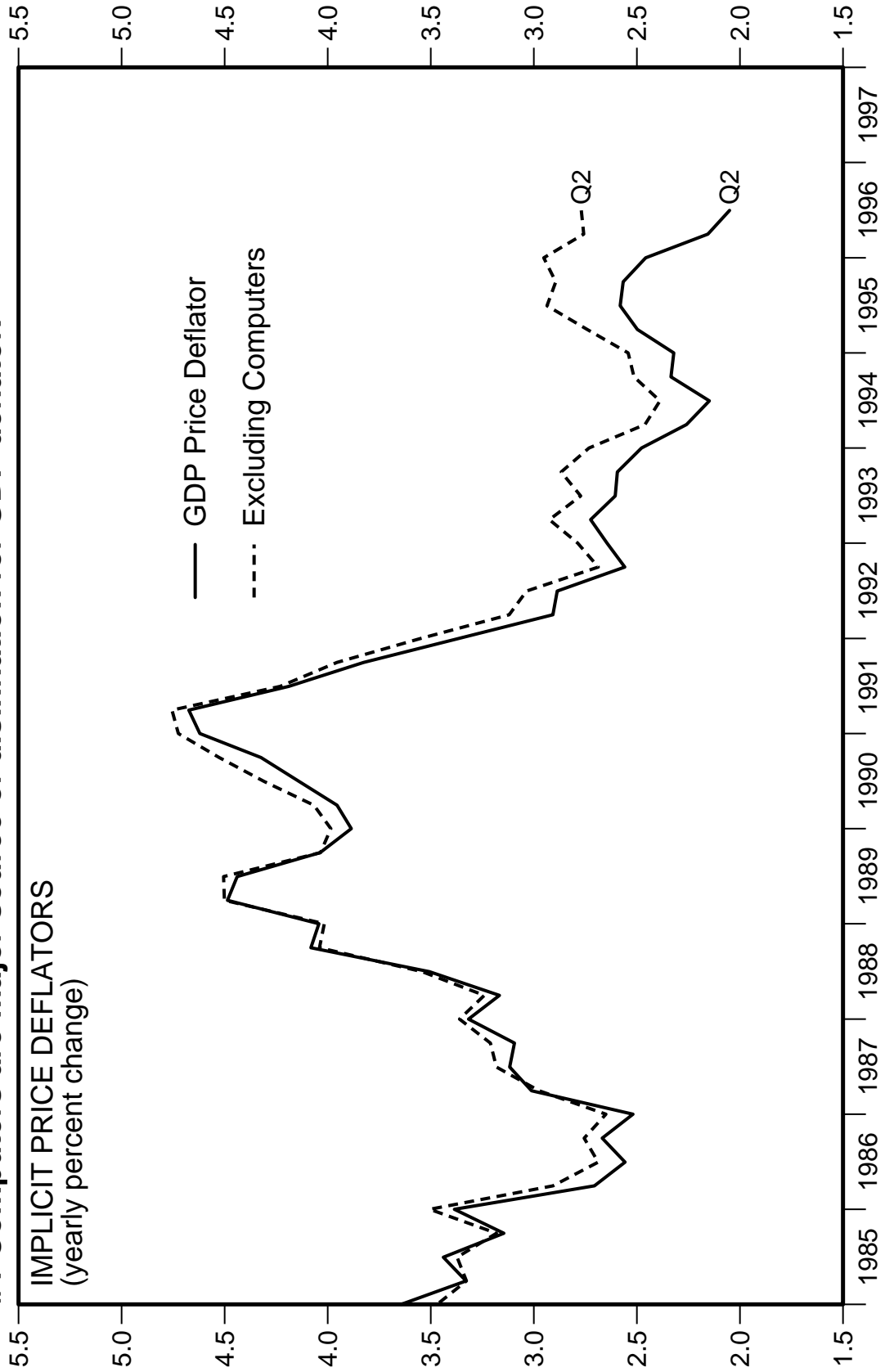


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# #1 Computers are major source of disinflation for GDP deflator.



## **I. The Global Auction Market**

Before the end of the 20<sup>th</sup> century, many of us could be spending at least 25% of our discretionary disposable income on goods and services purchased over the Internet. That's my guess. If I'm right, the economic consequences would be extraordinary.

Inflation probably would drop to zero. Conceivably, it could fall below zero. Deflation, or falling prices, could be one of the most significant and pervasive impacts of the widespread acceptance of the Internet by consumers.

Even today, Internet-savvy consumers are using so-called Internet Search Engines—like Yahoo, Alta Vista, and Excite—to find the lowest prices for the goods and services they desire to buy. The Internet is fast becoming a global auction market and could commoditize most markets for products and services.

The Internet lowers the cost of comparison shopping to zero. Increasingly, the consumer can easily and quickly find the lowest price for any good or service. In the cybereconomy, the low-cost producer will offer the lowest price and provide this information at no cost to any and all potential customers anywhere on the planet.

In the low-tech economy, the cost of searching for the lowest price was relatively high, thereby limiting a customer's search process to local or well-established vendors. Now vendors anywhere in the world can bid for business anywhere in the world.

## **II. A Deflationary Price Spiral**

Only the lowest-cost producers are likely to survive and prosper in the global cyber-marketplace. The resulting competitive pressures will force every business to strive to be among the low-cost producers. Prices for identical products will rapidly converge to the lowest price offered on the Internet.

This dynamic pricing environment could lead to a deflationary price spiral as global competitors slash prices. To survive, they will be forced to slash costs and boost productivity. The simplest way to boost productivity is to sell more units by cutting prices.

I first started to speculate about the economic implications of the High-Tech Revolution in 1993. I concluded that as computer hardware and software became 1) easier to use, 2) more powerful, and 3) cheaper, the economy would benefit in many ways. Most importantly, I predicted that the High-Tech Revolution would boost productivity and contribute significantly to the disinflation trend already in place since the early 1980s.

Now I'm thinking about the possibility that high-tech could actually be deflationary within the next 5-10 years.

The productivity story is still more forecast than fact. However, there is no denying that computers have become a big contributor to disinflation. I demonstrated this fact in the September 4, 1996 issue of the *Weekly Economic Analysis* I observed that the GDP price deflator is up 2.1% and 2.8% with and without computer prices, respectively, over the past year (Exhibit 1 on page 2). Computer prices are down 23% in the GDP accounts (Exhibits 2 and 3).

### **III. The Virtuous High-Tech Cycle**

In the September 4, 1996 issue of the *WEA*, I also observed that computers are becoming a significant source of economic growth. Indeed, computer purchases by both business and consumers accounted for fully one-third of real GDP growth over the past year. Real GDP was up 2.7% and 1.8% including and excluding computers, respectively, over the past four quarters (Exhibits 4 and 5).

In the real GDP accounts, computer sales are up 52% over the past year. Industrial production of office and computing equipment is up 45% over the past 12 months through September (Exhibit 6).

By comparison, industrial production excluding office and computing equipment is up only 2.1% over the past year. This series is highly correlated with real GDP excluding computers, which was up just 1.8% during the second quarter (Exhibits 7, 8, and 9).

Will computer sales continue to grow at today's astonishing rate? In a word, yes. In my opinion, the Internet is the "killer" application that will continue to boost the sales of computer hardware and software. It's the "got-to-have-it" tool and toy for the next century.

Internet-driven sales of high-tech gear will generate the cash flow and attract the financial capital needed by the computer industry to develop even more powerful computers at constantly falling prices (Exhibits 10 and 11). More powerful computers permit software developers to create more powerful multimedia programs. These processing and memory hogs, in turn, force computer users to upgrade to the latest generation of hardware, which is required to run the latest versions of the operating systems and applications.

In Biblical terms, better computers beget better software applications beget more demand to upgrade to even better hardware and software. The Internet begets more upgraders and more newbies.

#### **IV. Life In Cyberspace**

The Internet is becoming our virtual reality. We will all have our own little Mario Brother icon running around cyberspace, as in Nintendo 64. The Internet becomes the new cosmic marketplace of our globalized economy. We shop there. We sell there. We prospect for new customers. We compete for business globally. Our Internet vendors will fine-tune their computers to accept our customized orders. Internet computers will schedule the deliveries of our consumer staples and our industrial components by FedEx or UPS on a just-in-time basis. We'll make our long-distance phone and video calls over the Internet.

The biggest booster for the proliferation of the High-Tech Revolution among consumers is the recent introduction of true multimedia computers that can be used to watch regular cable television. Recently, both Gateway and Toshiba introduced combination PC/TVs.

Soon these entertainment units will also include access to the Internet through the cable box. Once the consumer can enter the Internet with his TV remote control, the demand for the new Internet-accessing technologies will explode. In other words, the best is yet to come.

#### **V. A Fellow CyberNerd**

I'm not the only economist hyperventilating about the High-Tech Revolution. In his own low-key fashion, so is Fed Chairman Alan Greenspan. He was especially upbeat (for him) in a speech he gave at the 80th Anniversary Awards Dinner of the Conference Board in New York on October 16, 1996. Here is my selection of pithy insights from Chairman Alan:

- 1) "Virtually unimaginable a half century ago is the extent to which concepts and ideas would substitute for physical resources and human brawn in the production of goods and services."
- 2) "Radical transformations in what we produce in the way of goods and services and how we produce them occur perhaps once or twice in a century, at most." (The railroad, telegraph, and electric power are three revolutionary technologies mentioned by the Chairman.)
- 3) "With the ongoing turnover of the capital stock, computer-related synergies will, presumably, substantially raise real value added per hour in the years ahead."
- 4) "One of the crucial ways in which computerization is already elevating living standards is by facilitating increasing customization to meet consumer needs."
- 5) "To measure productivity and standards of living we need measures of output but, to measure output, we need to be able to define products clearly and in terms of units that do not change from one period to the next...But what is a unit of software?"

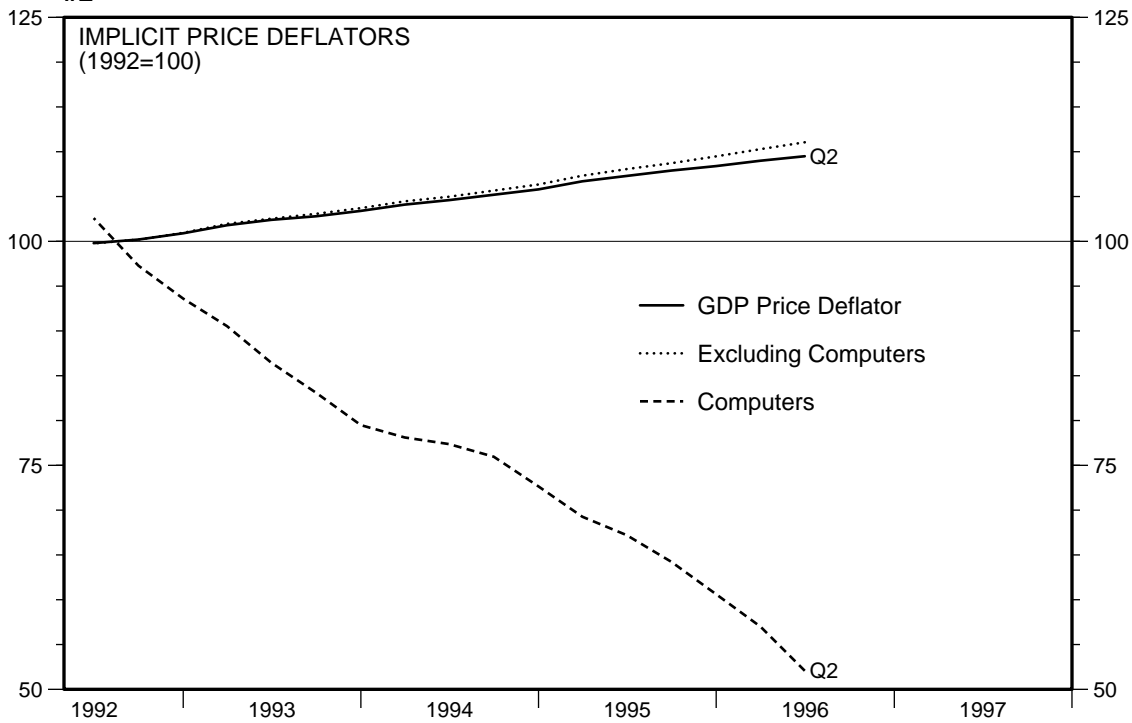
Clearly, the Fed Chairman is spending some time reading and thinking about the economic consequences of the High-Tech Revolution. His speech was virtually lifted out of an excellent survey article in the September 28 issue of *The Economist* titled “The Hitchhikers Guide to Cybernomics.” He was clearly impressed by the article written by Pam Woodall, the magazine’s economics editor. She too explores the economic implications of Information Technology (IT) and its relationship with the forces of globalization. She comes to most of the same broad conclusions I have in this Topical Study:

- 1) “What is different is that globalization in the 19<sup>th</sup> century was driven mainly by falling transportation costs, whereas now it is being driven by plunging communication costs, which make much deeper international integration possible.”
- 2) “Unlike steam power or electricity, IT can be both an input and a final product: it is capable of revolutionizing the production and distribution of other industries and services, but also offers a vast range of new products and services of its own.”
- 3) “On one estimate, computer power now costs only one-hundredth of 1% of what it did in the early 1970s...Never has the world seen such a dramatic fall in the price of an industrial input.”
- 4) “Falling prices, one of the best measures of the speed of technology progress, confirm the impression that the pace of change has accelerated. The rapid decline in prices also encourages more people to buy computers, allowing the technology to spread further.”

The one big difference between Ms. Woodall’s analysis and mine is that she is not as convinced as I am about the disinflationary, and possibly deflationary, consequences of the Internet. She still believes that inflation is fundamentally a monetary, policy-driven phenomenon. I think differently.

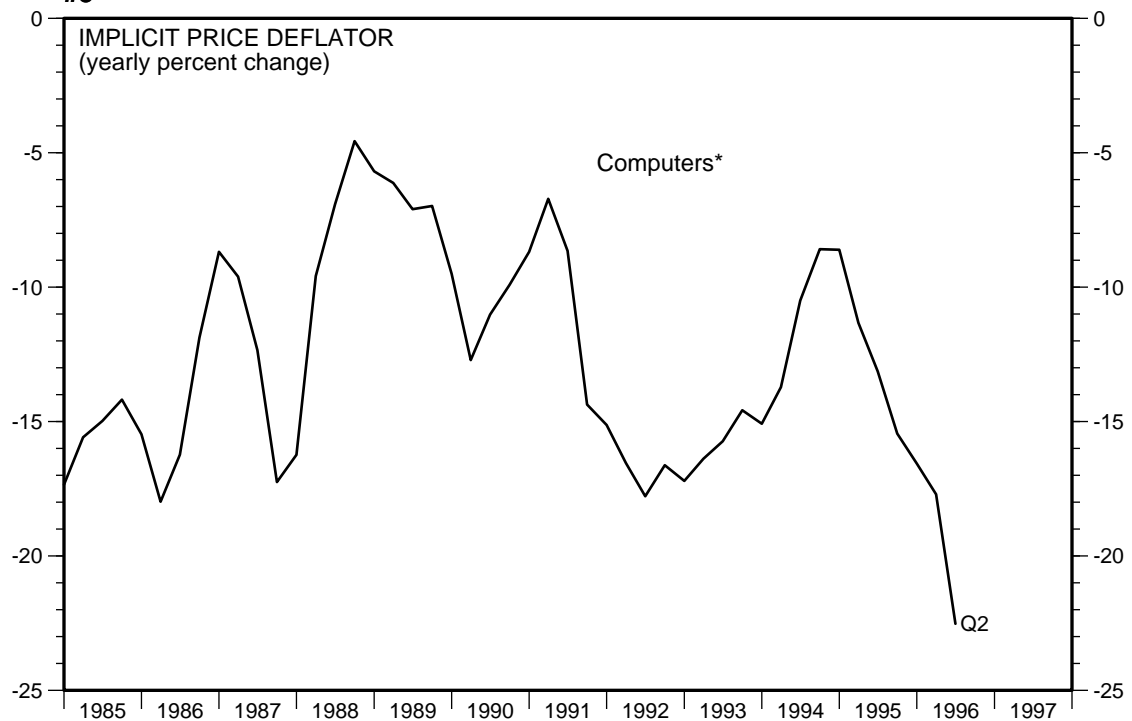
# - Computer Prices -

#2



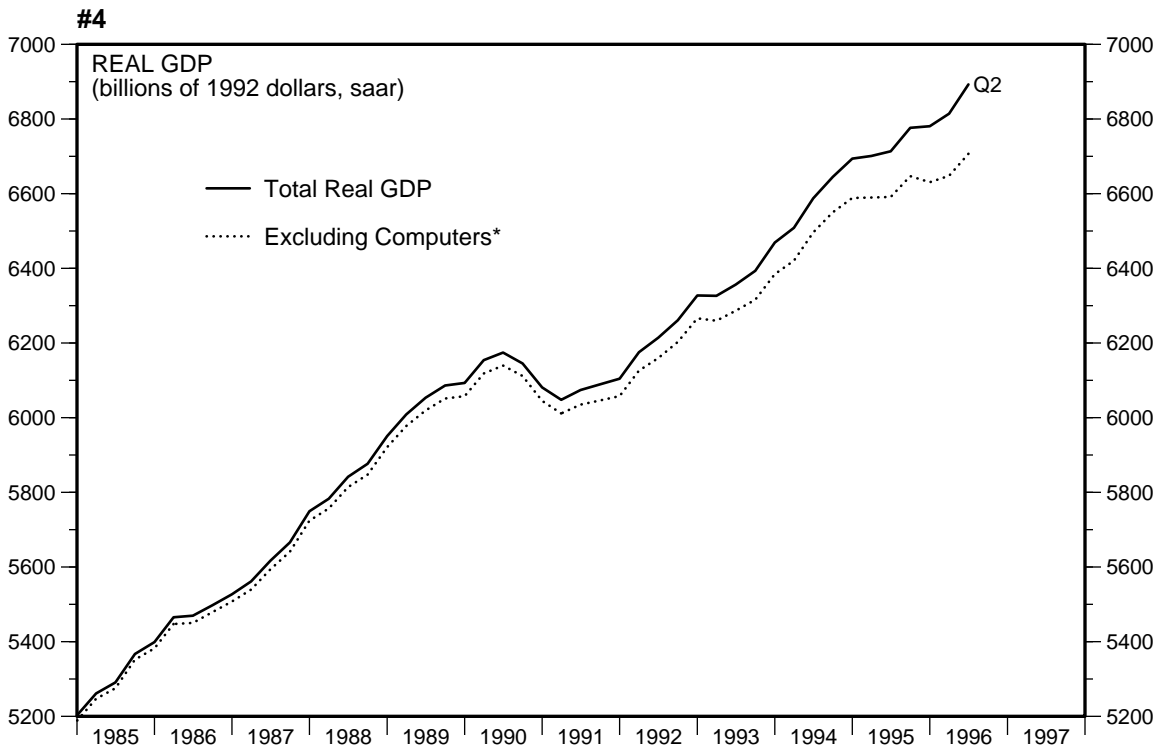
Computer prices are plunging in the GDP accounts. They are down 23% over the past year and 49% over the past four years.

#3



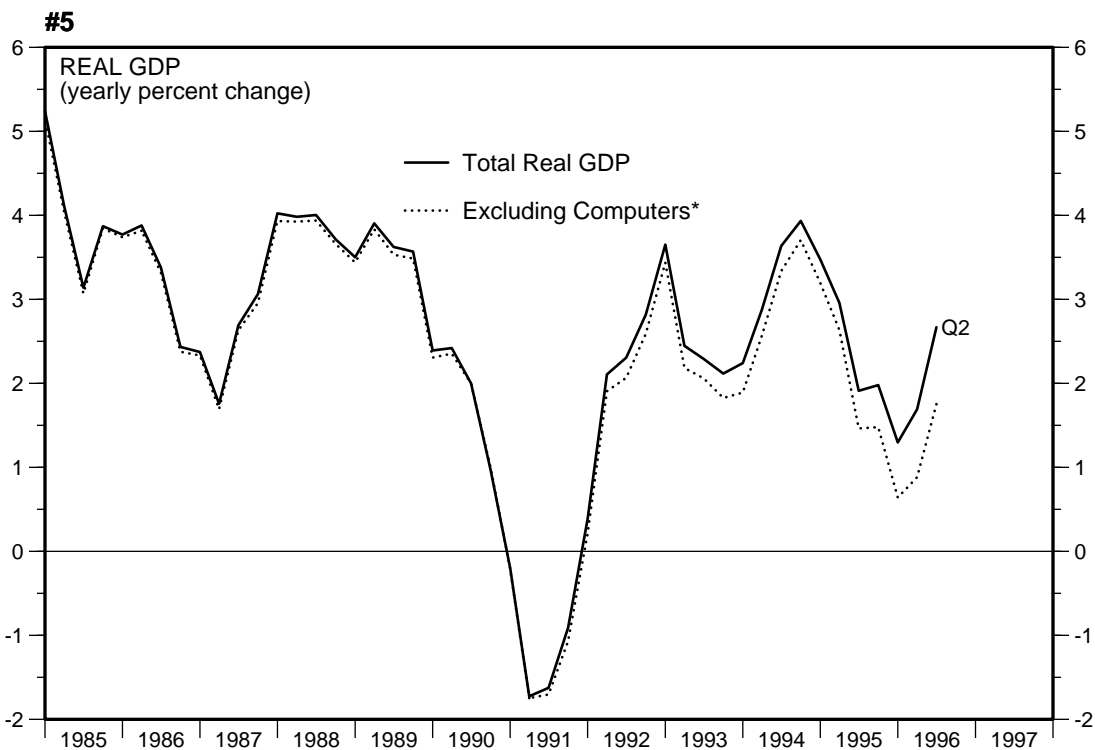
\* Includes both consumer and business.

# - Computers & GDP -



\* Consumer and business expenditures on computers.

Computer spending has added a full percentage point to real GDP growth over the past year. Over the past year, real GDP is up 2.7% and 1.8% including and excluding computers: It accounts for a whopping one-third of the increase in real GDP.

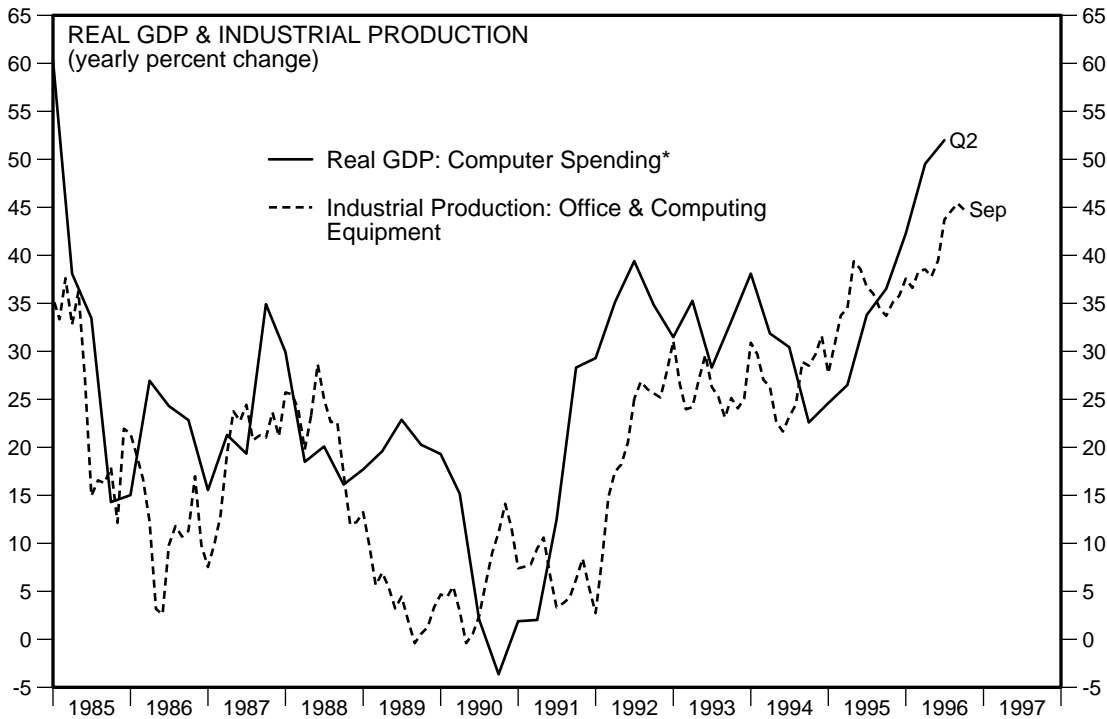


\* Consumer and business expenditures on computers.



# - Computers & Production -

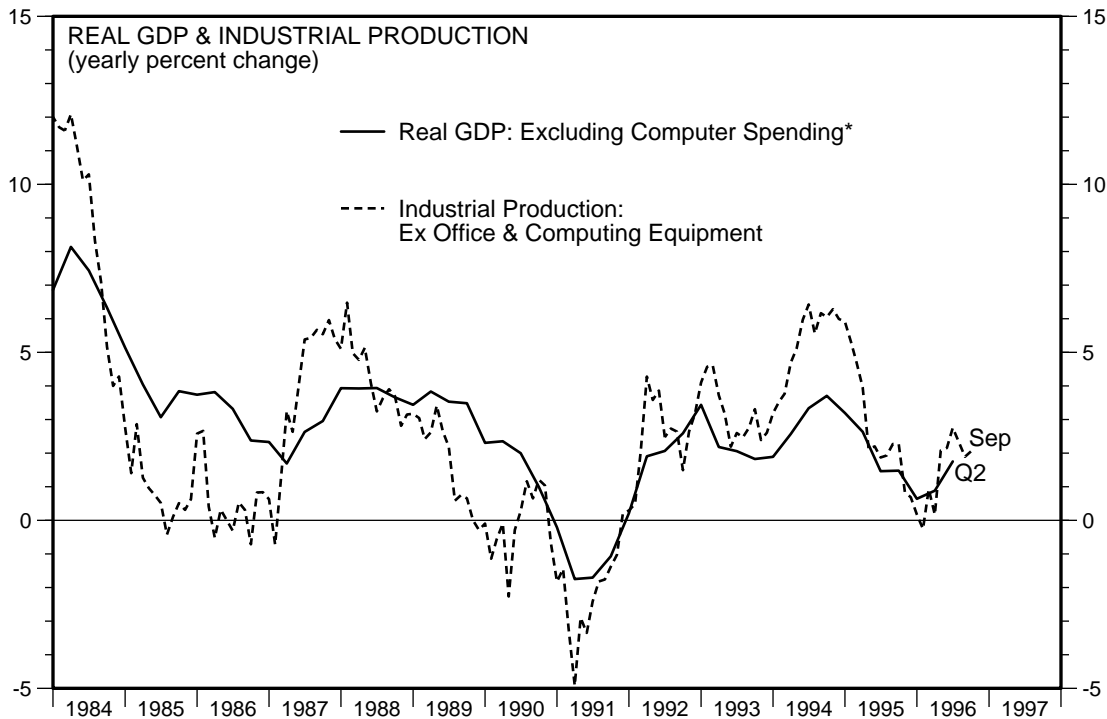
#6



Spending on computers is major source of recent GDP boom, soaring 51% over the past year, with business up 42% and consumer up 73%. Consumers now account for 32% of total computer spending, up from 16% in 1990.

\* Consumer and business expenditures on computers.

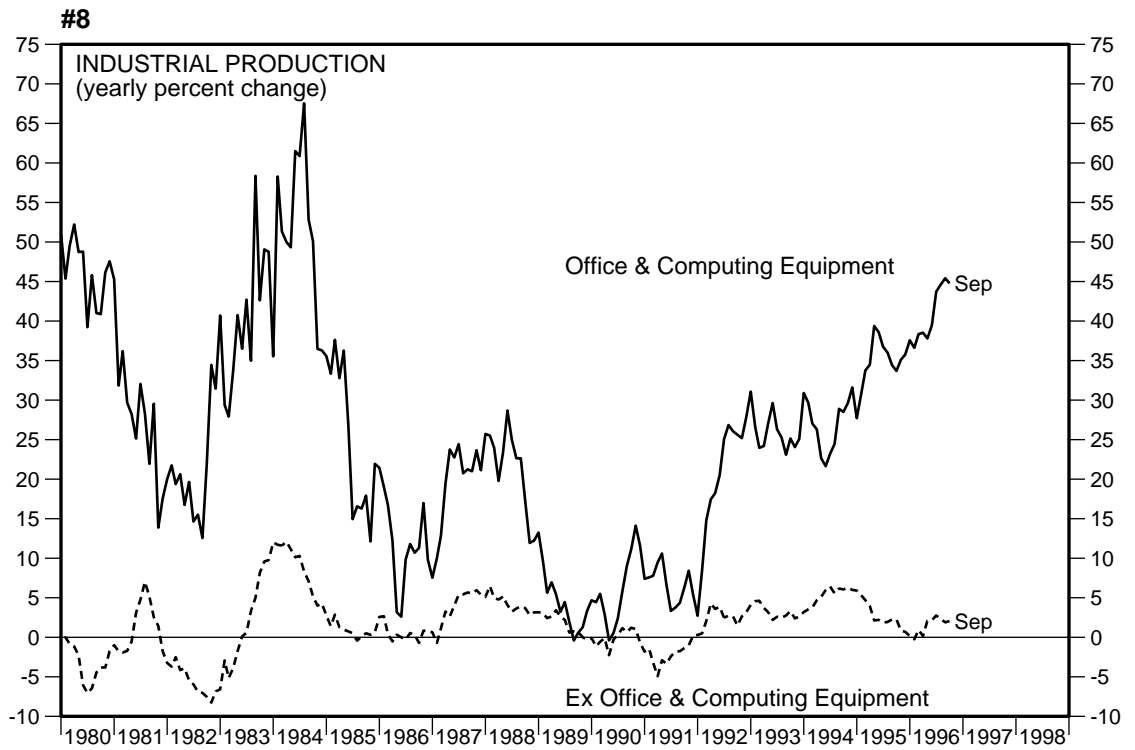
#7



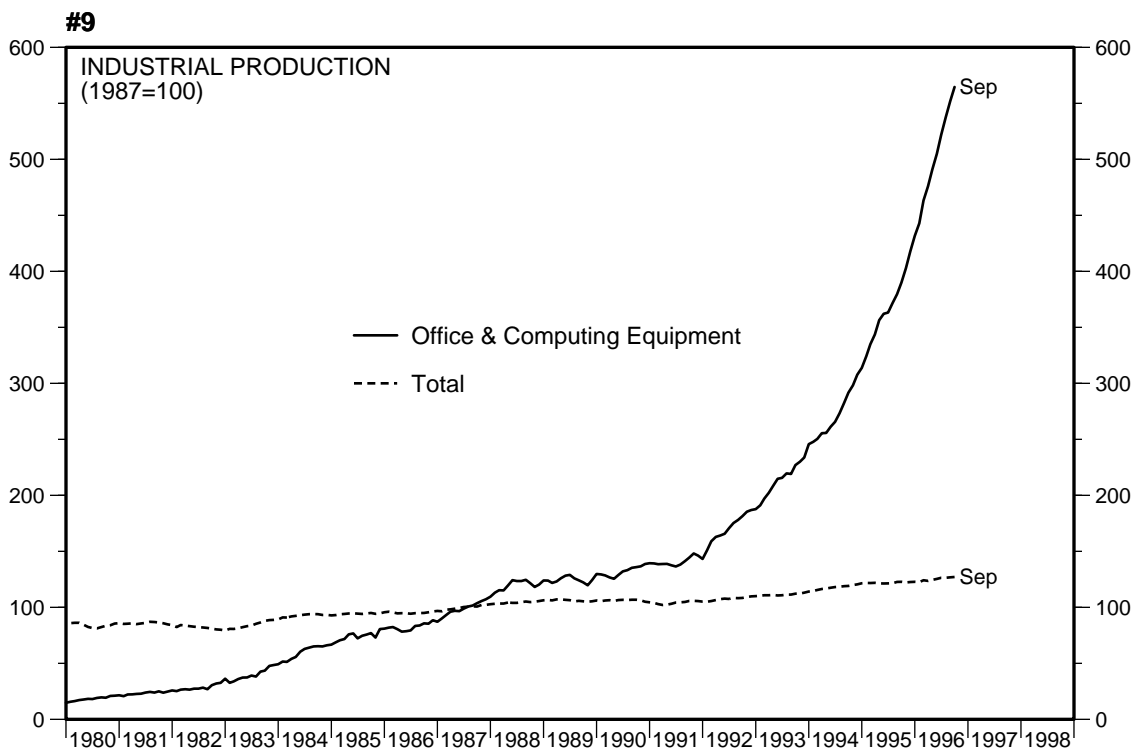
Low-tech economy growing slowly. Industrial production excluding computers is up only 2.1% over the past 12 months.

\* Consumer and business expenditures on computers.

# - Computers & Production -

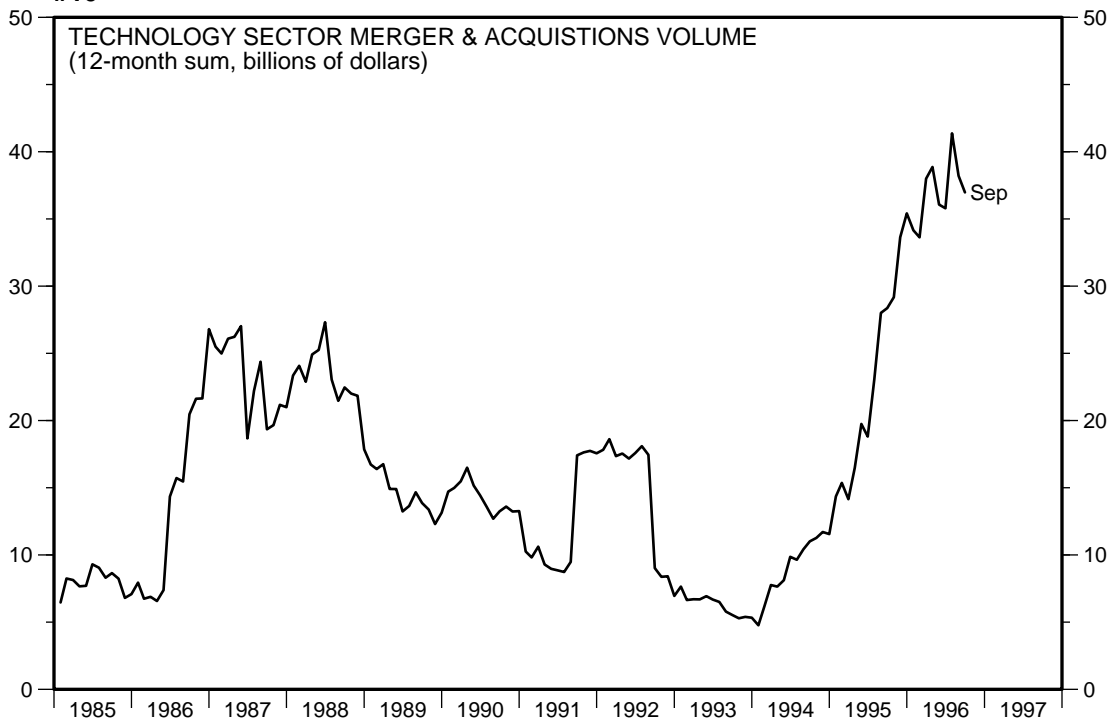


High-tech economy growing much faster than low-tech economy. Over the past 12 months, industrial production is up 3.5% and 2.1% including and excluding computers, respectively.



# - Computer Industry -

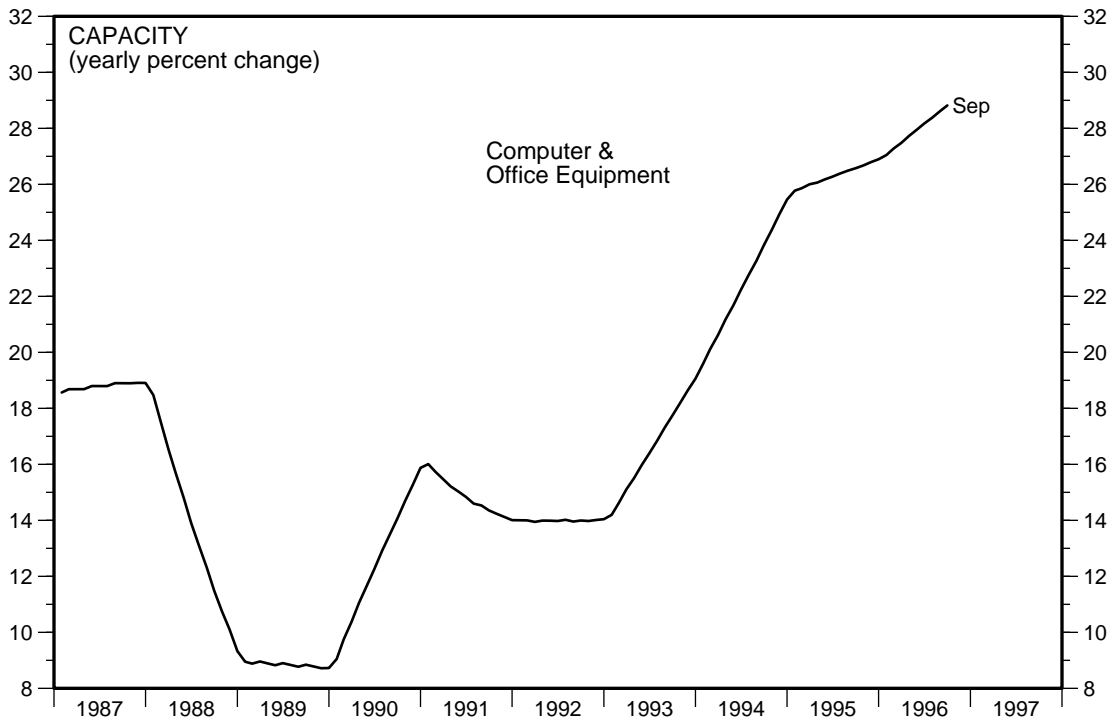
#10



Big jump in M&A activity in technology.

Source: Securities Data Corp.

#11



Extraordinary expansion in computer industry. Capacity is up 29% over the past 12 months and 243% since the start of 1990.

## TOPICAL STUDIES

- #11 Dr. Edward Yardeni and Deborah Johnson, *The Restructuring Of Corporate America Is Bullish*, December 9, 1987
- #12 Dr. Edward Yardeni, *How The Baby Boomers Are Changing The Economy*, April 6, 1988
- #13 Dr. Edward Yardeni, *The Coming Shortage Of Bonds*, June 20, 1988
- #14 Dr. Edward Yardeni, *Could Real Estate Prices Fall? And What If They Do?*, August 24, 1988
- #15 Dr. Edward Yardeni and David Moss, *The New Wave Manifesto*, October 5, 1988
- #16 Dr. Edward Yardeni with Amalia Quintana, *The Baby Boom Chart Book*, January 25, 1989
- #17 Dr. Edward Yardeni, *The Triumph Of Capitalism*, August 1, 1989
- #18 Dr. Edward Yardeni and Deborah Johnson, *Dow 5000*, May 9, 1990
- #19 Dr. Edward Yardeni and David Moss, *The Triumph Of Adam Smith*, July 17, 1990
- #20 Dr. Edward Yardeni, *The Collapse Of Communism Is Bullish*, September 4, 1991
- #21 Dr. Edward Yardeni with Amalia Quintana, *The Baby Boom Chart Book 1991*, October 9, 1991
- #22 Dr. Edward Yardeni, *Apocalypse Now! (NOT!)*, May 8, 1992
- #23 Dr. Edward Yardeni, *The End Of The Cold War Is Bullish*, September 10, 1993
- #24 Dr. Edward Yardeni, *Hard Or Soft Landing?*, February 6, 1995
- #25 Dr. Edward Yardeni, *The High-Tech Revolution In The US of @*, March 20, 1995
- #26 Dr. Edward Yardeni, *The US Economy's Mega-Trends*, July 10, 1995
- #27 Dr. Edward Yardeni, *10,000 In 2000*, November 6, 1995
- #28 Dr. Edward Yardeni, *Liquidity Story Is Wildly Bullish*, February 12, 1996
- #29 Dr. Edward Yardeni with Amalia Quintana, *The Baby Boom Chart Book 1996*, March 28, 1996
- #30 Dr. Edward Yardeni, *Backlash: Workers Vs. Bonds*, May 8, 1996

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