Topical Study #75:
The High-Tech Revolution II

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November 28, 2005

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I. Creative Destruction On Steroids

I believe we are on the threshold of the second stage of the High-Tech Revolution. Like the first stage during the 1990s, it should boost productivity, profitability, and prosperity. It should continue to increase competitive pressures in most markets and industries, thus helping to keep a lid on inflation and interest rates. It is likely to be much more global than the first stage, benefiting more consumers around the world. It is already enabling entrepreneurs and small businesses to find customers for their goods and services on every continent. It is inherently a democratic revolution both economically and politically because it eliminates barriers to entry in most markets and barriers to political enlightenment.

I first started to write about the High-Tech Revolution in the January 7, 1993 issue of my weekly commentary. I wrote that "the US economy is on the threshold of a major Technological Revolution, led by the personal computer. This revolution will continue to boost productivity well above the anemic growth of the 1970s and 1980s." In my Topical Study #25, titled "The High-Tech Revolution In The US of @" and dated March 20, 1995, I declared:

> I am more convinced than ever that our economy is rapidly evolving in a very positive direction. Real incomes will grow at a faster pace along with productivity. Bearish problems like the federal and trade deficits will be overshadowed by the bullish consequences of the High-Tech Revolution. I am especially bullish on the stock prices of high-tech companies….The secular trends unleashed by the High-Tech Revolution could overwhelm the cyclical pattern of the low-tech economy. This is not to say that the business cycle is dead. However, it may no longer dominate the course of economic growth as it did in the past.

Both productivity and real income per worker have been growing at average annual rates of 3% per year since 1995 after rising only 1% per year on average during the previous 25 years. This mostly explains why inflation has remained so low even as energy prices soared over the past two years. It is one of the main reasons why consumer spending has been surprisingly resilient since the start of this decade. The profits boom of the past three years has also been productivity-led.

In my topical study, I concluded that the "explosive growth in the number of Internet users is transforming our country into the US of @." I think the Internet is doing it again: It is leading us into the second stage of this revolution. If so, then during 2006 and over the rest of this decade, technology may once again create as much innovation, employment, and wealth as it did during the second half of the previous decade. This time the beneficial consequences are likely to boost productivity, profitability, and prosperity (P3) on a global basis. (For more on the P3 economy, see my Topical Study #74, "Productivity, Profitability, Prosperity," September 12, 2005. My most recent studies are posted at http://www.yardeni.com/Premium/ArchiveTS.aspx along with a complete list of all my studies since 1984, when I wrote my first one.)

For investors, this development should offer great opportunities, but also great challenges, which is why I am maintaining my market weight recommendation for the S&P 500 Information Technology sector. The second revolution is likely to be much more democratic. Most of its benefits will spread quickly to global consumers. Producers will have to scramble to remain profitable and to survive. Competitive pressures will be much more intense than during the initial phase of the upheaval. The pace of innovation will disrupt business models at a frenzied pace. Profitability on high margin "new, new things" will decay at exponential rates as they quickly become mass produced—everything becomes a calculator. Technology will be commoditized faster than ever. Think of Joseph Schumpeter's Creative Destruction on steroids.

The winners will be companies that innovate the fastest to maintain high profit margins. They will be the ones that introduce and exploit disruptive technologies best. They will be the ones that consolidate and optimize the power of users to use information and content with the underlying hardware, software, and communications technologies. In other words, they will all be like Google.

II. The New Revolutionaries

Intel, Microsoft, IBM and Cisco were the original revolutionaries during the early 1990s. Together, they developed the Internet-ready PC. The Internet joined forces with the new PC during the early 1990s, when Netscape introduced the Internet browser. Microsoft grabbed the leadership role with its Internet Explorer browser, effectively killing Netscape.[1] Revolutions are prone to constant upheaval. The dot-coms were the Jacobins who launched the next power grab. During the late 1990s, they created a speculative bubble that burst violently in 2000. At the same time, there was an underground movement by telecom companies to bury fiber optic cable everywhere to spread the revolution. The rebel forces were decimated and the survivors retreated as the cash-burning dot-coms self-destructed and their supporters blew up during the first half of this decade. Much of the cable remained dark and the so-called New Economy was buried along with it.

Long live the Revolution! The Internet has joined forces again with new and more powerful hardware and software. Wireless communications technologies are also reviving the revolution. The new revolutionary leader is Google, which derives its power by empowering people with its powerful search engine. Google is quickly developing into a major disruptive force upsetting the old regimes in advertising, publishing, broadcasting, entertainment, education, software, and retailing. Other business models are also likely to be challenged as well. Indeed, in an internal memo, one of Microsoft's chief technical officers essentially called on his troops to launch a counterattack to regain the initiative from Google, which is leading the web-based development model at the expense of Microsoft's dominance of PC-based software.

[1] In 1995, Netscape had 70% of the market for Web browsers. The company was acquired by AOL in 1999.

In my November 11, 2005 Morning Briefing, I enthused:

> The Internet is hot again. Google just rose to $400 per share. Advertising revenues are soaring for Google, Yahoo, MSN, and AOL. Cisco is reportedly acquiring Scientific-Atlanta. This could be the beginning of a wave of M&A activity in the Tech sector as the lines between the Internet, television, and telecommunications disappear. Tech companies are among those with the most cash sitting on their balance sheets. All this activity could also boost spending on the tech hardware and software necessary to integrate these rapidly merging businesses. All this activity may provide the answer to the following oft-heard question these days: What industry will lead economic growth in 2006 if housing continues to slow? The answer might very well be Technology! It may be doing it already. The year-over-year growth in industrial production of information technology has been significantly outpacing low-tech output since the start of the current economic expansion, and now it is showing signs of rising at even a faster pace….

Output of semiconductors, computers & peripherals, and communications equipment jumped 25% over the past 12 months through October, the fastest pace in nearly five years. So far in 2005, capital spending for high-tech gear accounted for two-thirds of all business equipment spending, up from only one-third in 2004.

III. Power To The People!

During the first phase of the revolution, business accounted for much of the spending on IT and the profits of technology companies. During the second phase, consumers will account for more of this spending as the prices of consumer electronics continue to fall rapidly. Retailers reported great sales following Thanksgiving led by consumer electronics as shoppers responded to extraordinary discounts. Normally, profit margins are already low, averaging about 3%. The boom in sales of cheaper and cheaper laptops, cell phones, and iPODs is already boosting the demand for semiconductors. One Laptop Per Child—a nonprofit organization funded by Google, Advanced Micro Devices, Red Hat, News Corp. and Brightstar—is overseeing a project to produce a $100 laptop for distribution to millions of schoolchildren in developing countries.

As new technologies disrupt business models, they also force businesses to spend more on these new technologies to remain competitive. Brick-and-mortar retailers continue to expand their online infrastructure as consumers do more of their shopping over the Internet. Verizon is starting to offer television programming over its fiber optic cable network. Cable TV companies are offering telephone service over their broadband networks. Cities are installing wireless Internet networks. Wireless cash registers are now available using Blackberry devices. Telecommunications services providers were big spenders on IT during the 1990s. They are likely to be big spenders again.

Some of the increased IT spending will be attributable to business expenditures on technologies that will allow their employees to work from home. This should be partly in reaction to the higher cost of commuting to work as energy prices remain high. It should also be in response to the need of aging Baby Boomers for more flexible working hours as the age of retirement rises. However, it will mostly be motivated by the increasing need of companies to be ready to function during natural disasters like hurricanes, earthquakes, and most importantly pandemics—as well as following terrorist attacks. The November 28, 2005 issue of *BusinessWeek* included a story titled "Avian Flu: Business Thinks The Unthinkable." It observed that some major corporations are already working on contingency plans: "Another response is keeping people apart to limit the disease's spread. That means technology and support for working from home or teleconferencing."

During the second stage of the High-Tech Revolution, the IT industry is once again becoming an important source of economic growth, new jobs, and higher incomes as it was during the first stage in the 1990s. The November 23, 2005 issue of *The Wall Street Journal* reported that Google has helped fuel a hiring frenzy in Silicon Valley reminiscent of the dot-com boom. The firm actually tracked down all women from the top 50 universities worldwide who had graduated after 1980 with advanced degrees in physics, math, or computer science.

IV. A Global Revolution

Globalization also stimulates a huge demand for technology. In my Topical Study #63, titled "China For Investors II: The Games" and dated January 21, 2004, I observed, "To accommodate the roughly 20 million people per year migrating to the cities, the Chinese, in effect, have to build a Houston, Texas, per month." This is why I was bullish on commodities last year and energy over the past two years. Over the next few years, this building boom should be even more bullish for technology since the new cities will have state-of-the-art IT systems. According to the November 25 issue of *The New York Times*, several old urban centers in China are being demolished and rebuilt or relocated. Several municipalities are replacing their urban centers with huge brand new developments:

1) In Shanghai, the government is clearing 1,300 acres of riverfront land and relocating about 50,000 residents and more than 270 factories, including the country's largest shipyard, to build a site for the World Expo to be held in 2010.

2) Out west, in the city of Kunming, there are plans to create three new areas that will ring Dian Chi Lake, doubling the city's size to five million by 2020.

3) In Zhengzhou, the capital of Henan Province, the city hired a Japanese designer to develop a master plan for a new 58-square-mile town.

4) In Changchun, the capital of Jilin Province in the north, the city government and the central business district are also being relocated to a new city center.

5) In Harbin, a city of nine million (which is currently facing a water pollution crisis), officials plan to build a new city center called Songbei—a 285-square-mile area that will be packed with residential high rises, office towers, luxury villas, five-star hotels, shopping and entertainment complexes, trade zones and industrial parks. Songbei is roughly the size of New York City.

All those new cities will undoubtedly include new airports. That's good news for the global commercial jet industry and related technology companies. As China continues to prosper, energy prices are likely to remain high, thus boosting prosperity among oil exporters. Dubai is leveraging its oil windfall by diversifying its economy. The country is building a huge airport that is already a major international hub.

Dubai is rapidly emerging as a regional financial center. Morgan Stanley is opening an office in the Dubai International Financial Centre. This will be its first in the Middle East. Invesco is the latest fund manager to open an office in the DIFC. Next year, Dubai is removing a prohibition on collective investment funds.[2] During the 1990s, the US financial industry was among the major customers for technology. Now, the global financial industry should be ordering lots of computers and communications equipment.

The bottom line is that several domestic and global trends are converging to revive the High-Tech Revolution. This should be bullish for both economic growth and for the US stock market during the second half of this decade as it was during the second half of the previous decade. The following charts review the recent performance of several key tech-related economic and financial variables.

* * *

[2] *Financial Times*, November 25, 2005, p. 1.

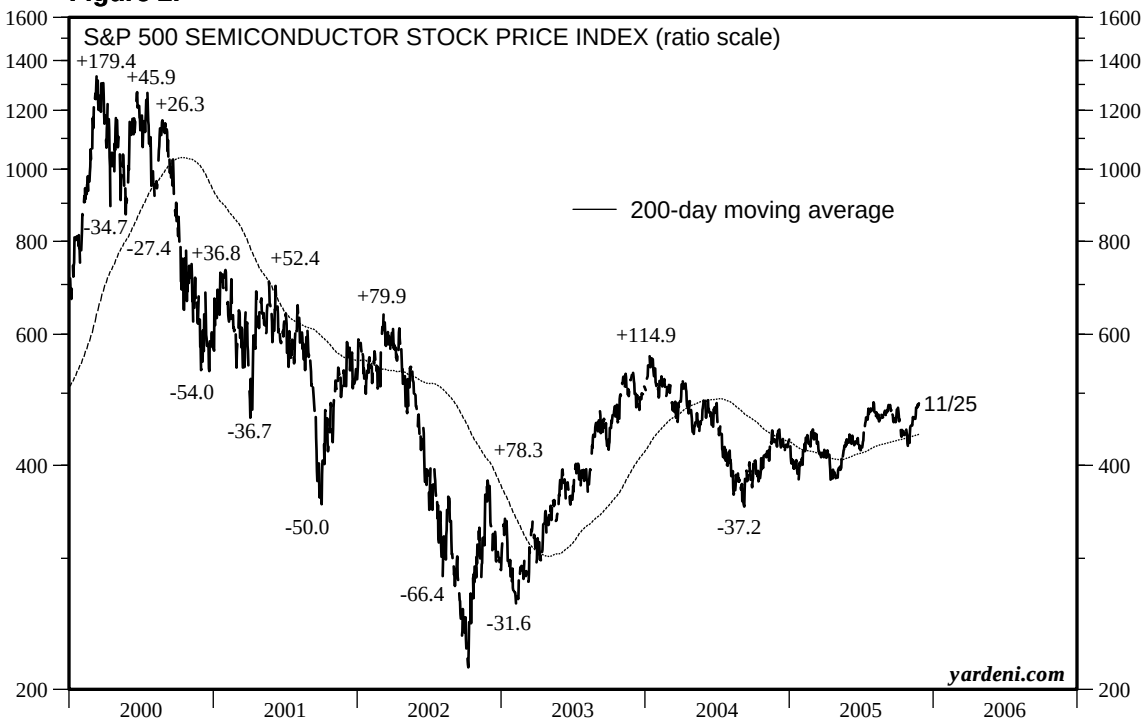
- S&P 500 Tech Indexes -

Figure 1.

Tech stocks rebounding after testing 200 dma, which remain relatively flat.

Source: Standard & Poor's Corporation.

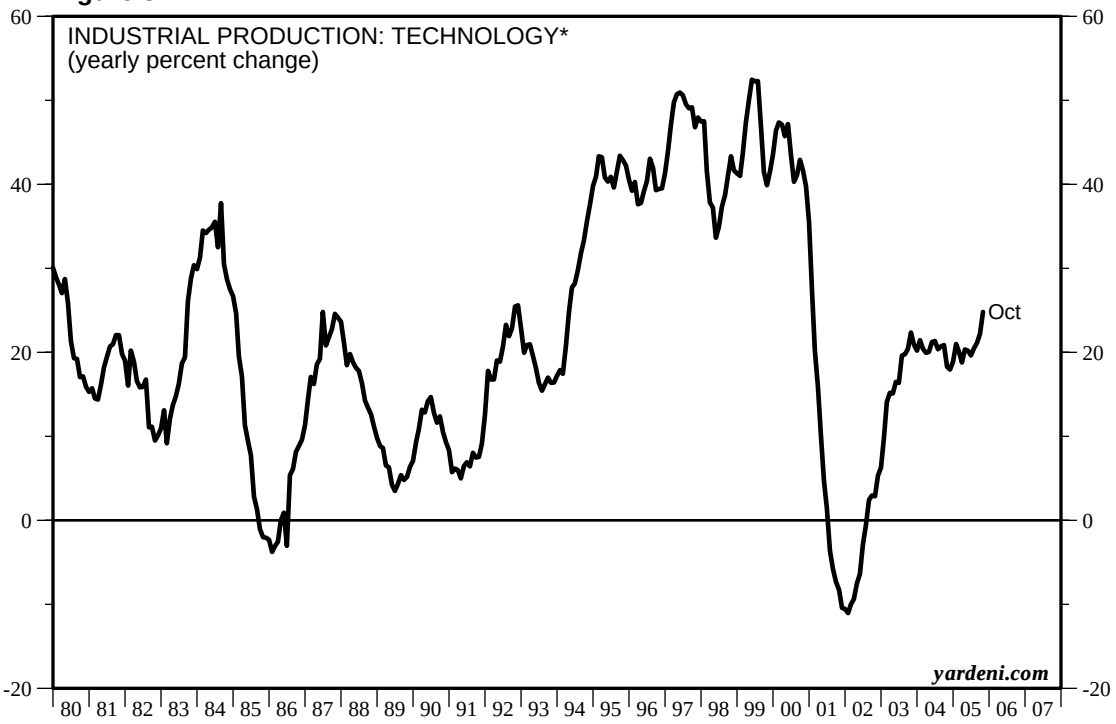
Figure 2.



Source: Philadelphia Stock Exchange.

- Production -

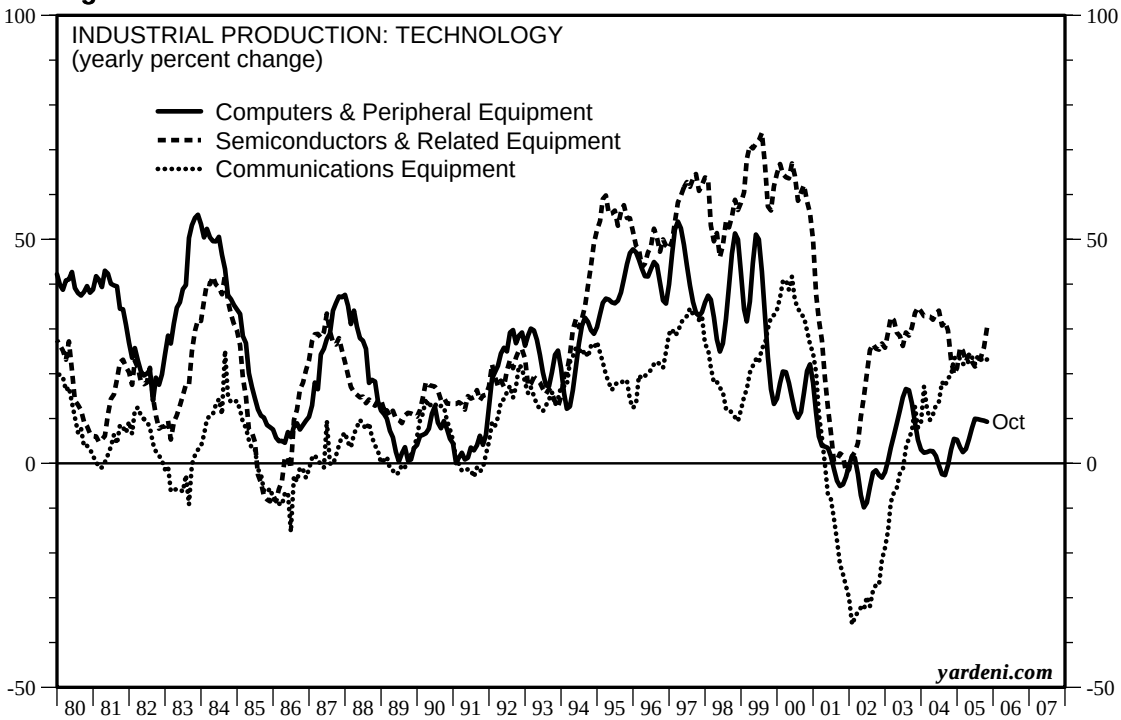
Figure 3.



Tech output growing rapidly and may be speeding up.

* Includes computers, communications equipment, and semiconductors.
Source: Board of Governors of the Federal Reserve System.

Figure 4.



Source: Board of Governors of the Federal Reserve System.

- Capacity Utilization -

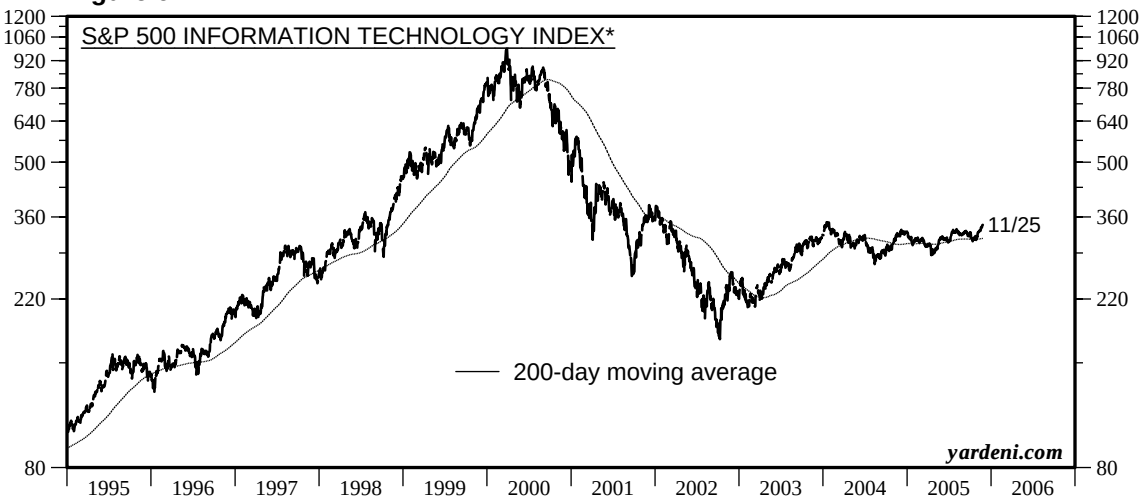
Figure 5.

* Includes computers, communications equipment, and semiconductors.
Source: Board of Governors of the Federal Reserve System.

- S&P 500 Information Technology -

Figure 6.

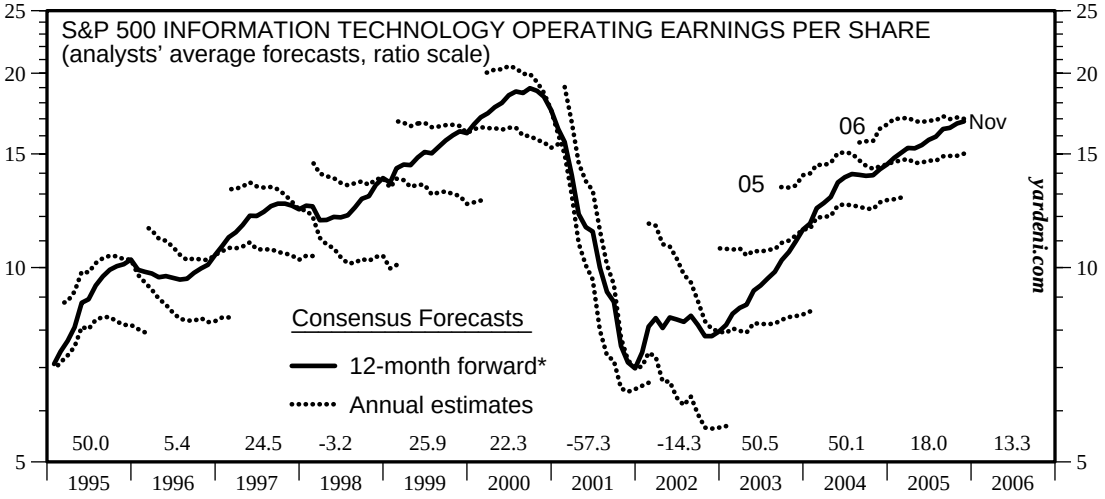
S&P 500 Tech index has been in a flat trend for the past 2 years.



* Ratio scale.

Figure 7.

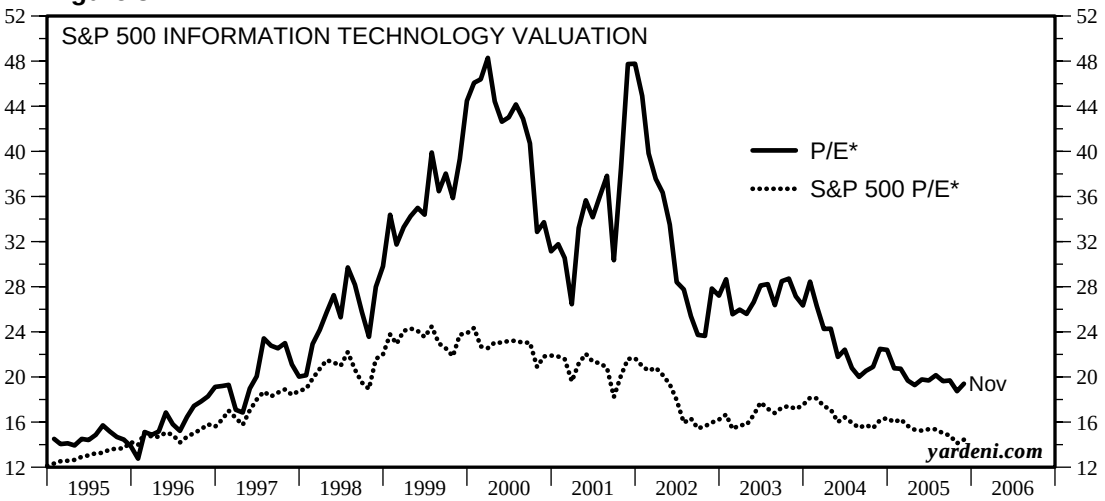
Tech forward earnings approaching 2000's record high.



* Time-weighted average of current and next year's consensus earnings estimates. Numbers above time line are annual growth rates.

Figure 8.

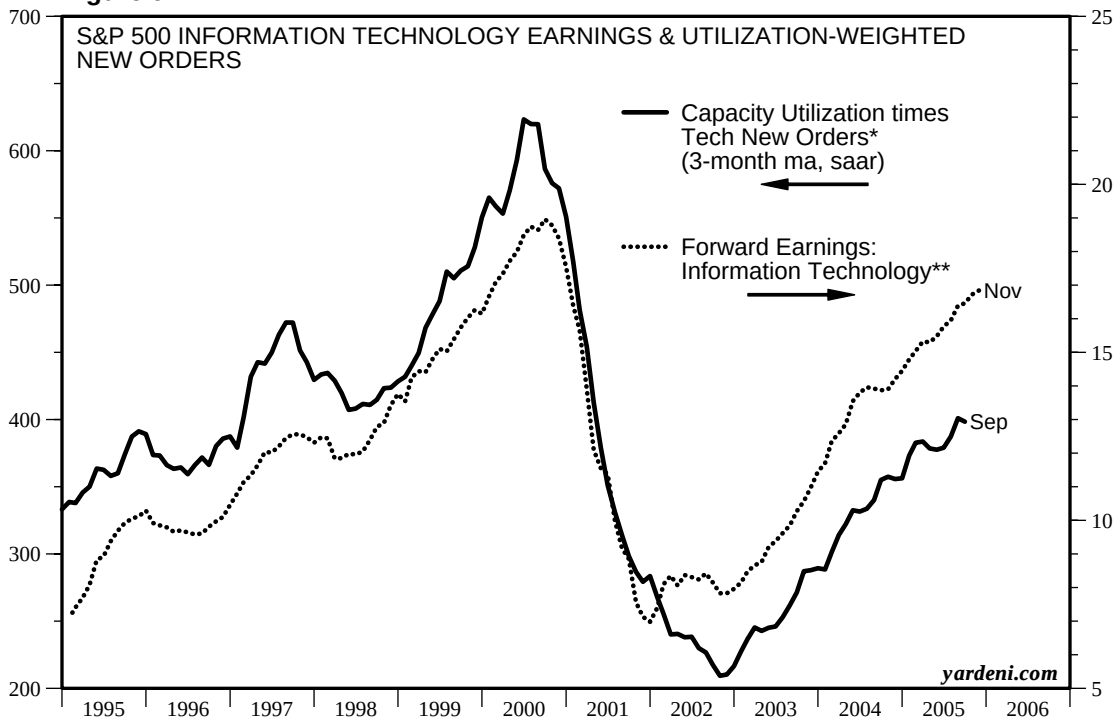
Tech P/E still the highest of the 10 S&P 500 sectors. Prior to 1998, Tech's P/E was usually close to market's P/E.



* Price divided by 12-month forward consensus expected operating earnings per share using mid-month data.
Sources for all charts: Standard & Poor's Corporation, Thomson Financial, and Haver Analytics.

- Forward Earnings & Orders -

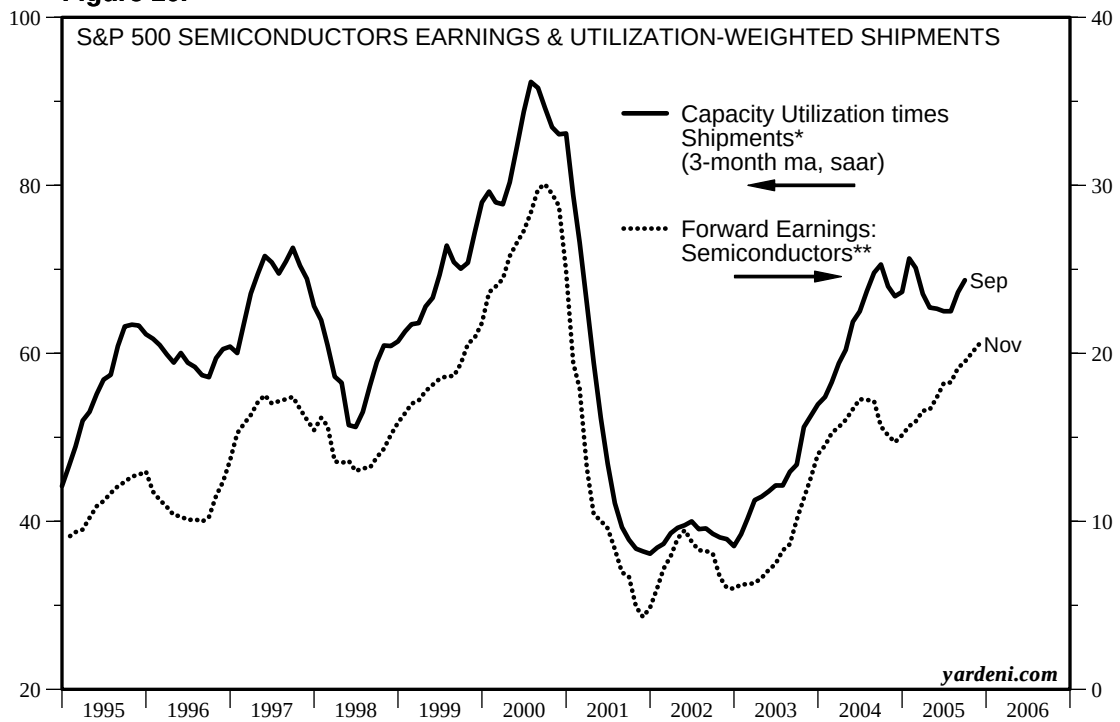
Figure 9.



Tech's forward earnings and orders remain on uptrends.

* Includes computers, communications equipment, and semiconductors.
** 12-month forward consensus expected earnings per share for S&P 500 Information Technology. Data from 1996 forward based on new Global Industry Classification Standard.
Source: Thomson Financial and Board of Governors of the Federal Reserve System.

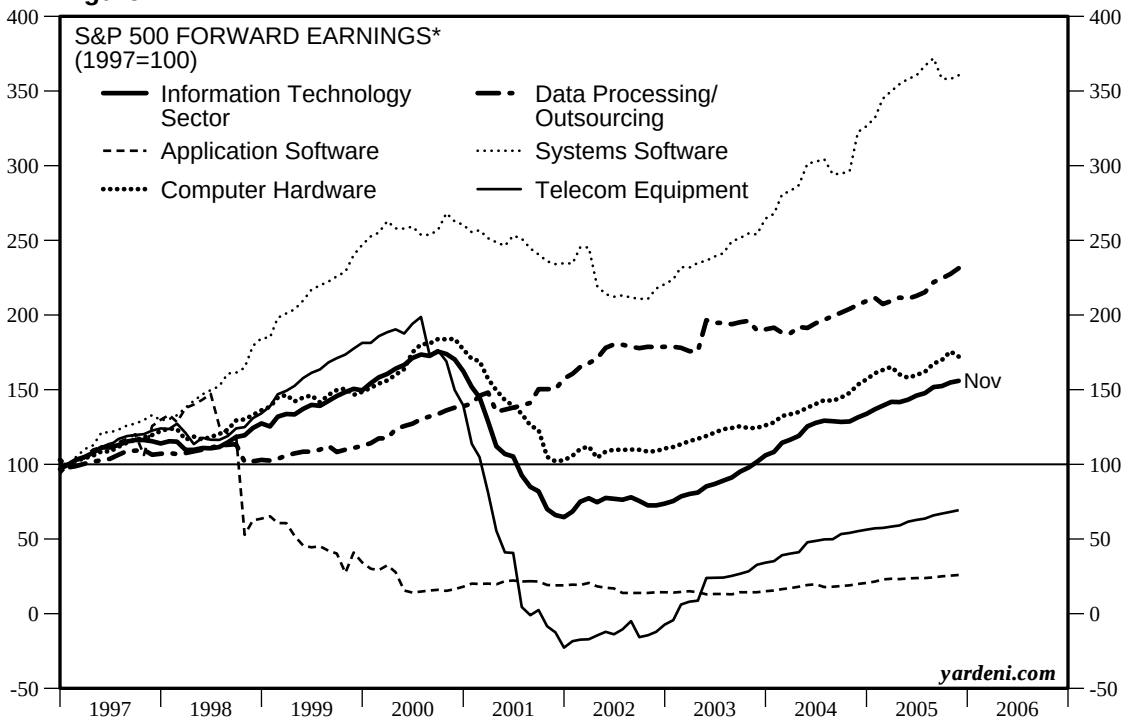
Figure 10.



* Semiconductors shipments.
** 12-month forward consensus expected earnings per share for S&P 500 Semiconductors.
Source: Thomson Financial, Board of Governors of the Federal Reserve System and US Department of Commerce, Bureau of the Census.

- Relative Earnings -

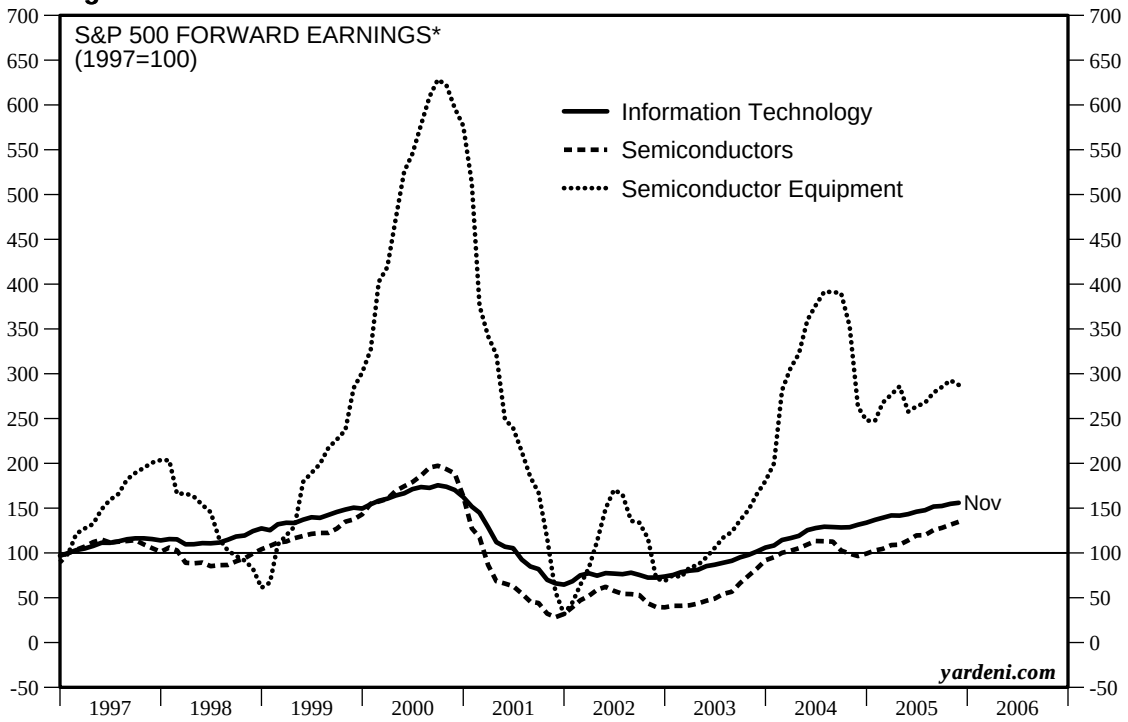
Figure 11.



* 12-month forward consensus expected operating earnings per share.
Source: Thomson Financial.

Most Tech industries showing gradually rising forward earnings this year.

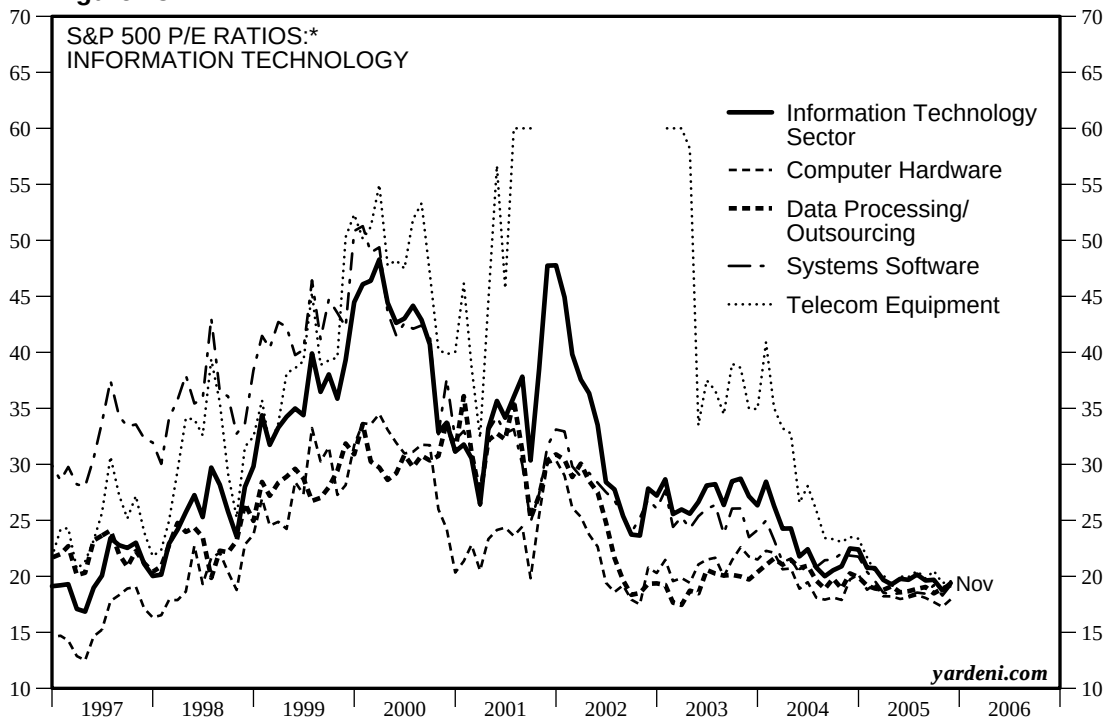
Figure 12.



* 12-month forward consensus expected operating earnings per share.
Source: Thomson Financial.

- Relative P/Es -

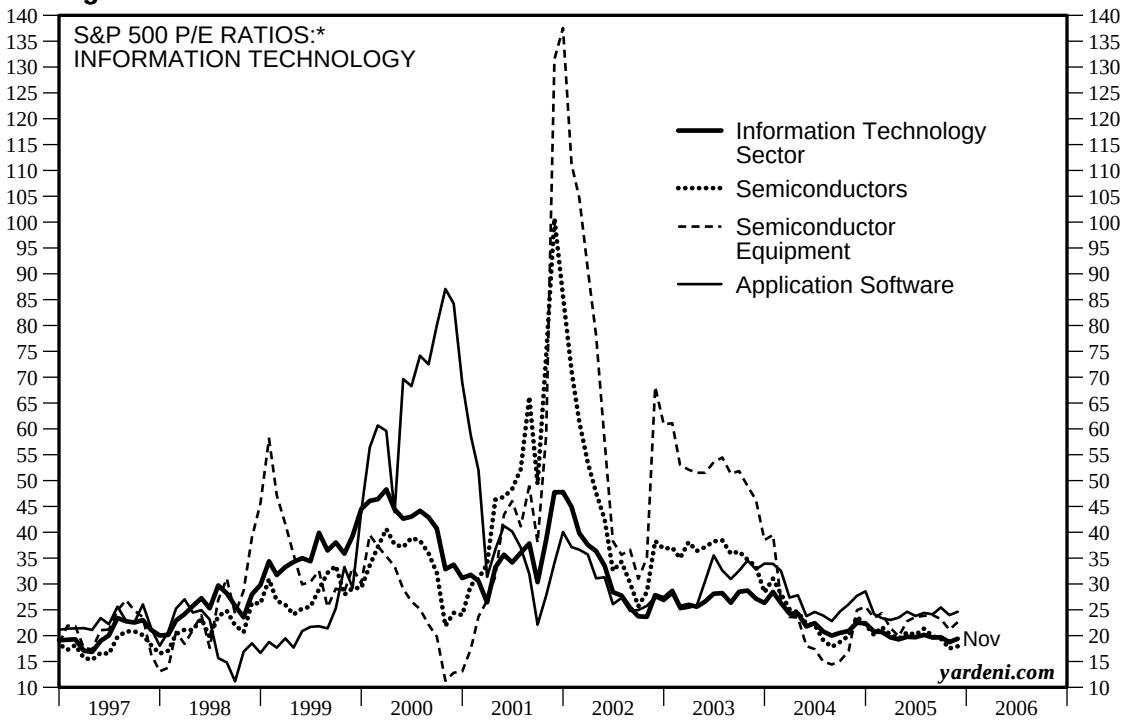
Figure 13.



* Price divided by 12-month forward consensus expected operating earnings per share using mid-month data.
Source: Thomson Financial.

Valuation multiples among the various Tech industries are much more compressed than usual.

Figure 14.

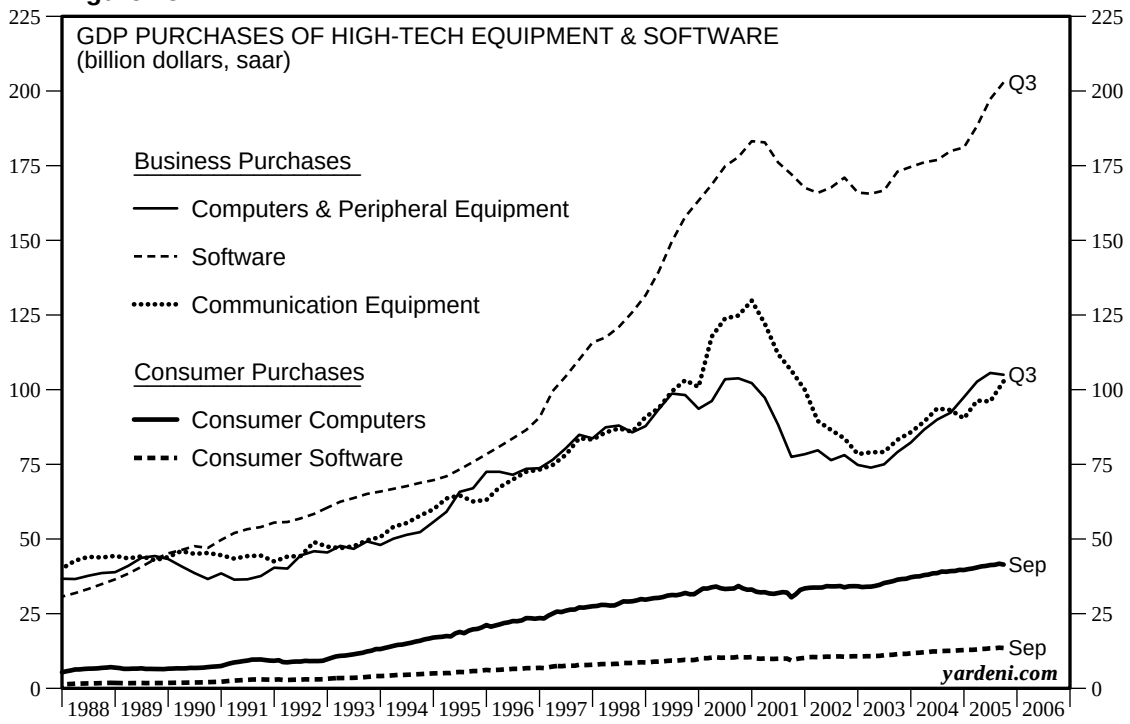


* Price divided by 12-month forward consensus expected operating earnings per share using mid-month data.
Source: Thomson Financial.

- High-Tech GDP -

Figure 15.

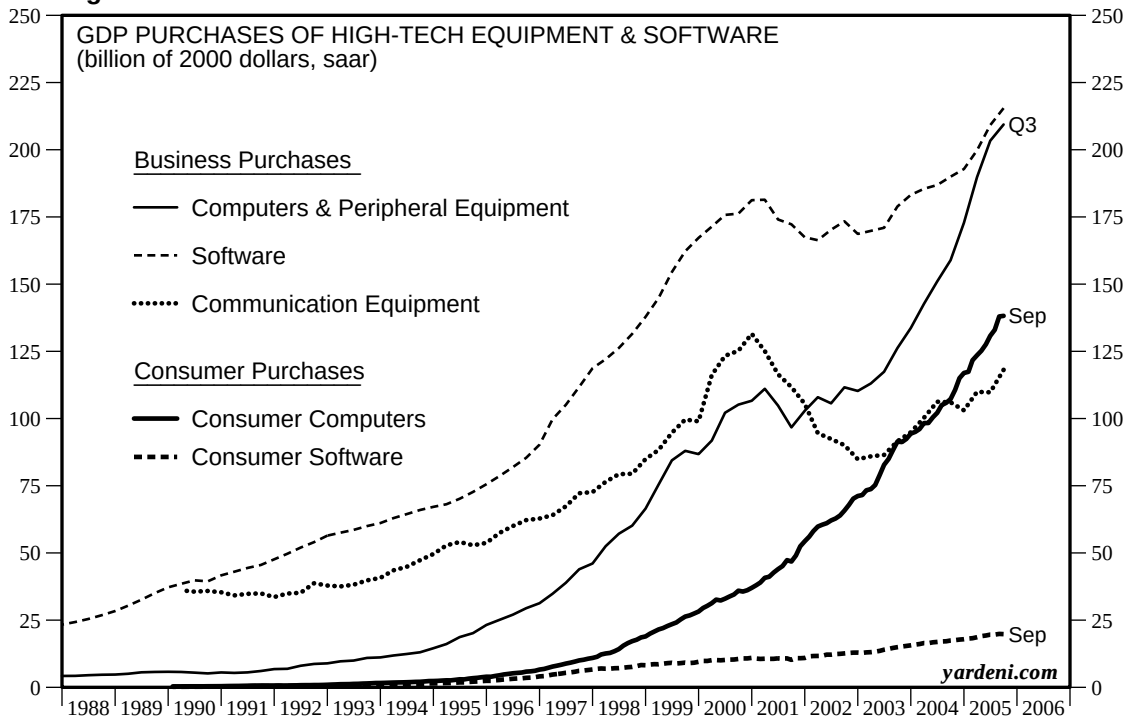
In current dollars, business spends twice as much on software as on either computers or communication equipment. Consumers spend about half as much on computers as businesses do.



Source: US Department of Commerce, Bureau of Economic Analysis.

Figure 16.

In real terms, business spends as much on computers as on software.



Source: US Department of Commerce, Bureau of Economic Analysis.

Additional Information Available on Request.