8

Maybe the New Economy Isn't So New

Even with the dramatic slowdown in economic activity in late 2000–2001, you can't help but be excited about the future and amazed about the past. The decade of the 1990s was one of extraordinary expansion and growth, particularly over the last five years. And much, much more is yet to come. As we discussed earlier, the IT revolution, for all its glory, is still in its infancy. The world of infinite bandwidth—communication power—is now imaginable. This will mean ubiquitous, always-on computing and Internet access. The day will come soon when computers will be imbedded in virtually everything. And IT is not the only thing to look forward to.

We are on the precipice of major breakthroughs in medical science that will dramatically alter all of our lives. I would argue that the breakthroughs we will see in the next decade will dwarf all developments in medicine to date. These have tremendous implications, not just for the quality and quantity of our years on Earth, but also for our retirement planning, investment horizon, career planning, and general economic behavior.

Some have suggested that the development and broad use of the fuel cell to replace the internal combustion engine should also be seen as one of the seminal and important developments of the next ten or twenty years. And major discoveries in nanotechnology will, as we saw in Chapter 4, revolutionize manufacturing and so much more. Increasing returns to knowledge assure that the speed of change will be rapid in this, the Acceleration Age, and that the developments will be profound.

This is not new. Although the speed of acceptance of new technologies has certainly accelerated, an innovation cycle has been evident for more than two hundred years. Ever since the beginning of the first Industrial Revolution in the late 1700s, we have seen wave after wave of innovation roughly every fifty to sixty years. Once or twice a century, as Alan Greenspan has pointed out in many of his speeches, a new technological advance meaningfully alters the way the economy works, boosting growth, enhancing productivity, and often literally changing society. We saw it in the mid-1800s with the introduction of the railway and at the turn of the last century with the automobile, electricity, and the radio. The economic impact of these technologies is well known, but their social impact is equally as important. The electric lightbulb extended the working day and allowed for a new scope of evening activities—night baseball, for one. Prior to electricity, most of the population went to bed a lot earlier than they do today, not too long after sundown. The railroad allowed for the transport of people, not just goods, across great expanses. Remote towns could prosper as long as they had a railway station and regular train stops. Heaven help the town if the railroad decided to discontinue service. The car was the impetus for the development of the suburbs after World War II—the relative isolation of the housewife, the commuting dad, strip malls, fast food, drive-in movies, and the trucking industry.

These were not easy or instantaneous transitions. Often the pace of progress was halting at first, then overly euphoric, and then overly pessimistic, as the pendulum of human behavior and market psychology swung from one extreme to the other. The fact remained, however, that these technological breakthroughs had a profound effect on many aspects of life: the costs of production, transportation, and communication; productivity growth; the location of the population; the mass culture; and the political scene.

I believe that today we are in the early days of another upwave in the innovation cycle. This time, the breakthrough technologies are the Internet and the application of digital technology to the life sciences. We might also include fuel-cell technology and nanotechnology as secondary, but still significant, scientific developments. This period, as before, is fraught with risk and disappointment. Change is always difficult as many leaders in business and politics attempt to protect the status quo, fearful of change and innovation. Imagine how the stagecoach operators felt when the railroad came or how the kerosene and coal manufacturers reacted to the advent of electricity.

The dot-com crash should not be seen as the end of the upwave. Quite the contrary. While it was wrong to expect too much of the dot-coms, it is equally wrong to expect too little. We are in the early days of an upwave in the "Long Cycle." This is a once-in-a-lifetime cycle. It occurs every fifty or sixty years. In upwaves, expansions are long and strong and recessions are short and mild. Gyrations can be great, but the trend is up. This upwave, I believe, will last at least another ten to fifteen years, and maybe longer.

THE LONG CYCLE

Living in a world of tremendous volatility and change, we inevitably get caught up in the day-to-day orbit of our lives, our businesses, our careers, and our investments. But I believe it is important to look at the economy from a longer-term perspective, as well. Too much of my time is spent focusing on the very short-term movements in financial markets and economic indicators. And while monitoring the business cycle is what I get paid to do, it is useful and appropriate to put this cycle in an historical framework. I find it quite enlightening to think of the world in the context of the long wave—a decades-long cycle around which the shorter-term business expansions and contractions revolve.

The long wave was first spotted by Russian economist Nikolai Kondratieff in the 1920s and is sometimes called the Kondratieff wave.[1] It is a controversial concept; many quibble endlessly about how it should be measured. It is very difficult (virtually impossible) to pinpoint the exact dates of peaks and troughs in the long-term economic cycle. I don't think

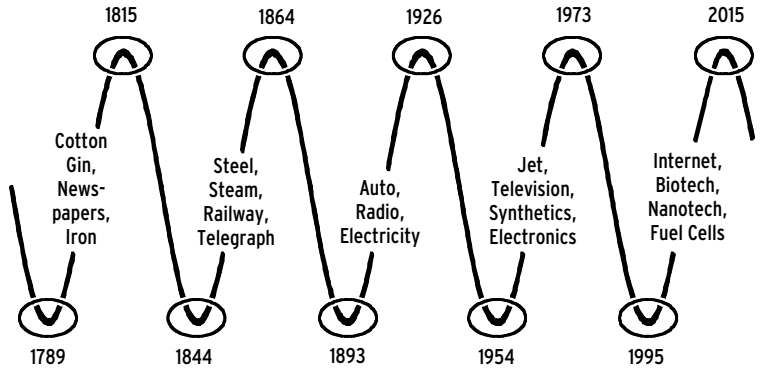
this really matters. The fundamental usefulness of the construct—the model—remains. The concept of a long wave has moved more into mainstream thinking in recent years with the endorsement of Alan Greenspan.

Greenspan and I have both accepted the concept of the long wave without necessarily attempting to map the precise dates of the cycle. There are significant statistical problems in doing so. Data are needed back to the end of the eighteenth century, well before government statistics agencies were set up to collect it. But nevertheless, those who have attempted to do the analysis conclude that a discernible long cycle in economic activity can be mapped out (Figure 8.1).

Kondratieff caused such an uproar with his cycle research in post-Revolution Russia that he was arrested and sent to Siberia. His work angered the Bolsheviks because it showed that downturns in capitalist economies were self-correcting. Kondratieff's work fell on a far more receptive audience in the United States. Joseph Schumpeter, with his now-famous theories of creative destruction, followed in the Russian's footsteps. Schumpeter is seen as the first New Economy thinker because of his interest in technological advance and its implications for economic growth. Continuing the research today is, among others, Stanford economist Paul Romer. As I discussed in Chapter 1, Romer analyzes the

Figure 8.1

The Long Wave



importance of knowledge and ideas in the growth process, seeing these as intrinsic to growth, rather than as exogenous forces.[2]

Breakthrough Technology

It was not the computer, per se, that triggered the current upwave. We have had computers on our desks for twenty years. It was the networking of computers in a global information highway that spurred the forces of change, reducing the costs of communication to nearly zero and triggering a flurry of productivity-enhancing activities. The biotech revolution has barely begun. As I discussed in Chapter 4, we are on the precipice of major breakthroughs in medical science, and this combined with the developments in the nanotech world and fuel-cell research will continue to contribute to head-spinning change for the next decade or more.

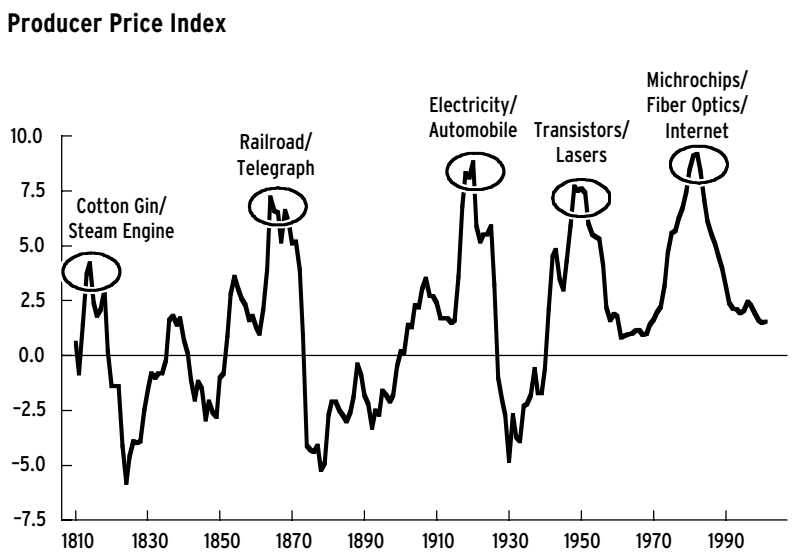
In all upwaves, the new inventions or discoveries trigger an enormous disinflationary process (Figure 8.2). Businesses reorganize, costs decline, efficiency rises. The quality and variety of products increase. These factors combine to raise real wages and the standard of living. Family living standards rise even more than the economic numbers can capture, because the improved quality, service, and selection often cannot be readily measured. Prices fall, particularly for the new products and services that are introduced. The economic pie gets bigger, and though there continue to be disparities, for the most part, everyone is better off. Today there is the so-called digital divide—determined more by "know and know-nots" rather than "have and have-nots"—but the jobless rate fell throughout the 1990s across the knowledge spectrum. As we have seen, the biggest improvements were for the unskilled and untrained—the hard-core unemployed—who were finally lured into the job market by the booming economy and the desperate need for workers.

Upwaves are periods of considerable dislocation, often accompanied by intermittent periods of excessive optimism and pessimism. While jubilation may run hot and cold, the constant churning that innovation causes can be very painful. New must replace old, and new-new replaces new. The product life cycle can be very short. Many of the winning tech companies in the early 1980s are long gone—Commodore, Wang, Control

Figure 8.2

Mitigating Inflation ... Technological Breakthroughs

(year-over-year percent change: ten-year moving average)



Data. IBM was quick enough to move from the mainframe to PC and then on to network and Internet servicing. A less-nimble company would have long ago joined the ranks of Wang. Those people or regions that cannot or choose not to adapt are left embittered and often disadvantaged. It is not easy to ride an upwave, but it can be very rewarding.

Wars Also Play a Role in the Long Cycle

Military engagements have been instrumental in the timing of the long wave cycles. Defense establishments—in the U.S., Europe, Israel, and elsewhere—have led much of the advanced tech research in the world. Wars themselves are distracting, expensive, destructive, and inflationary. However, they also trigger substantial innovation. There is nothing like an armed conflict or a rabid enemy to get the scientific juices flowing,

even if for the purpose of mass destruction. What we find is that once the war ends, the military innovations often can be put to lucrative and beneficial peacetime use. We saw this with the computer, radar, the airplane, anesthesia, the Internet—just to name a few. Even atomic research has found its civilian uses.

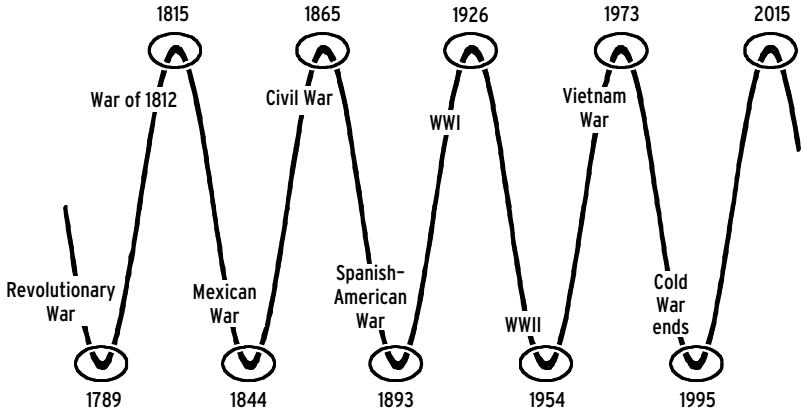
Turning points in the long cycle have often been associated with major military encounters. Some long-wave theorists attach importance to the popularity of the military engagement: the end of a popular war triggers an upwave, while the end of an unpopular war marks the beginning of a downwave. While this is highly controversial and may be putting too fine a point on the theory, for the United States, something like it can be seen in the long-cycle pattern (Figure 8.3).

Consider the coincidence of cycles with wars in American history. The end of the Revolutionary War—certainly a popular war in the Colonies—ushered in the era of the cotton gin, the threshing machine, and iron working. Transportation routes such as canals and roadways were the big infrastructure projects. The upwave ended with the relatively unpopular War of 1812.

The next upwave began around the time of the Mexican War and lasted for roughly twenty years, eclipsed by the devastation of the Civil

Figure 8.3

Military Encounters and the Long Wave



War. This was the period of the railroad, the steam engine, the telegraph, and the first telephones. The building of the American railroad infrastructure led to booming labor markets. Transportation costs plunged as the railway and steam ships allowed for the transport of goods across former regional boundaries. Cities and towns flourished along the routes. The prices of goods, most notably food, fell sharply as agricultural products were whisked from the Midwest farms to the East Coast cities. The prices of all household goods declined as wage rates rose. Real family purchasing power increased sharply. Productivity growth surged and communication capability rose dramatically with the telegraph.

This communication breakthrough, invented in the 1830s, increased the flow of information through the economy. Tom Standage, a journalist with the *Economist* magazine, has called the telegraph "the Victorian Internet."[3] However, the telegraph remained too expensive for the average consumer, so the transformation of communication on a broadly based scale awaited the telephone and later the Internet. The steam age moved production from the household to the factory; the railroad allowed for the development of mass markets and all of the economies of scale that they entailed.

The next major upwave followed the end of the Spanish-American War in 1898 and lasted until well after World War I. This was the age of electricity, the radio, and the automobile—a spectacular period of economic transformation. With electricity, the assembly line became possible. It took years for the full effect of the productivity gains to be measured, as businesses needed to literally rebuild their operations to take full advantage of the new technology, a phenomenon that has been well documented in the computer age as well. New technologies often initially create more problems and inefficiencies than they solve. This is what economist Robert Solow (cited earlier) was referring to when he said that the computer boom was evident everywhere but the productivity statistics.

Electricity markedly enhanced living standards in countless ways, reducing communication costs, transforming the production process, and removing the constraints of the rising and setting of the sun. Automobiles, radio, the first aircraft, the first office machines, photography, and the development of plastics all contributed to the improvement in living standards during this period. Automobile sales

doubled in the 1920s, bringing with them similar gains in the demand for steel, glass, rubber, and highways.

But the population's move to the suburbs awaited the next upwave at the end of World War II. A swell of soldiers returned home to marry and start families. The Baby Boom began. The pent-up appetite for consumer products was ravenous. The technologies of the earlier upwave were adopted on a mass-market scale. Electricity touched off a spectacular wave of innovation in the home, from washing machines to vacuum cleaners. The liberation from the tedium of repetitive household chores had a lasting effect on the role of women and society at large. Adding to these innovations were the first computers, transistors, jets, rockets, lasers, and television. The leading industries were consumer durable good manufacturers, such as the automakers and electronics companies, as well as the producers of synthetic materials and petrochemicals. This was the Industrial Age—the age of chemistry. There was an enormous build-up of infrastructure: highways, airports, schools, libraries, television networks, and airlines.

The era ended with the end of the very unpopular Vietnam War in 1975, not long after the first OPEC energy crisis and the resultant recession. What followed was a period of stock market decline, economic stagnation, and inflation—the downwave. While the stock market finally began to recover in 1982, with the end of the period of dramatic monetary tightening, I do not date the next upwave—the current one—until well after the end of the Cold War in 1989. The Gulf War in 1990-91 touched off a moderate recession. The rebound was initially halting, as we have seen. I date the beginning of the current upwave at 1995. By then, the Internet was a force on the American scene; within two years a critical mass of households—roughly one-third—had adopted the new technology for home use.

WILD GYRATIONS

There are those who fear that the very acceleration in the speed of change will short-circuit the current upwave. Never before has a new technology been adopted as rapidly as the Internet. Does that mean that the Internet upwave may only have lasted five years, culminating in the

Nasdaq crash of 2000? I believe not. While we have seen a major meltdown in the value of TMT stocks, the underlying forces of expansion remain extremely positive. The complementary development of the mobile Net and limitless bandwidth will have a profound further effect on IT development, as I discussed in Chapter 3. The applications in the future will be enormously exciting, thanks to the development of voice-recognition technology and video streaming. As yet, less than 10 percent of the world's population is online; even in the rich world, the figure is only just over 35 percent. While the U.S., Canada, Australia, and the Scandinavian countries are ahead of the pack, the opportunities for global growth of TMT businesses in these countries are immense.

But the news won't be all positive, as we have so painfully seen. In every upwave there are excesses—speculative bubbles—that often burst with surprising ferocity. We lived through that in 2000–2001. History has shown us that technology-driven downturns can be traumatic, particularly when the new technology has captured the imagination of the population.

Take, for example, the railroads, which dominated the economy in the second half of the 1800s, just as IT does today. During this period, whenever railroad expansion took a breather, the economy and the markets were pummeled. A slowdown in railroad construction helped trigger the panic of 1873, an economic contraction that lasted until 1879. The failure of railroads, such as Philadelphia & Reading Railroad Co. in 1896, and the resulting financial panic helped cause the near-depression and widespread layoffs of the 1890s. We marked this tumultuous period as one of a downwave, but I do not believe that the dot-com sell-off marked the beginning of a downwave this cycle. Too much is yet to happen with the Net and other burgeoning technologies. An information technology revolution remains in place, with bullish implications for long-run productivity and growth. The U.S. is in a long wave upturn that began in the mid-1990s and still has many years to run. Nevertheless, technology is a cyclical sector and there was substantial overinvestment in IT during the boom years—especially in 1999 and the first half of 2000. It is likely, therefore, that IT investment growth will contract in 2001 for the first time since 1991, as the excess capacity is worked off.

In a similar vein to the railroads in the nineteenth century, the expansion of the auto industry was a major thrust for the boom in the early twentieth century. Between 1893 and 1914, there were 1.7 million automobiles registered in the United States, but by 1920 there were more than 8 million and by 1929, there were in excess of 23 million cars. Auto demand peaked in 1929 because the Fed raised interest rates and because the car-buying needs of Americans were temporarily sated after a decade-long splurge. At first, the rest of the economy seemed to hang in. But without the impetus from the car industry, the boom could not continue. The result was the October 1929 crash and ensuing downturn, which hit the automakers and their suppliers first and hardest. It wasn't until the Fed started easing monetary policy years later that the auto industry began to recover.

Fortunately, the Fed is a lot more savvy today and understands the importance of the technology sector for the future well-being of the economy. When the tech stocks plunged in 2000 and the economy weakened sharply, the Fed responded quickly.

The past offers some good news for the present. Despite the viciousness of the railroad and auto-led downturns during earlier downwaves, the industries came back stronger than ever. The 1890s slump was followed by a resumption of railroad expansion. From 1895 to 1915, the number of passenger miles traveled by rail nearly tripled as Americans took advantage of fast, cheap transport. In addition, cheap shipping costs contributed to the rapid productivity growth of the early twentieth century.

Moreover, like today, the railroad and automobile booms led to the entrance of too many competitors, many of which went under when the economy slowed. Between 1900 and 1910, a whopping 485 automobile companies entered the industry only to ultimately disappear, just as today hundreds of dot-com companies have shut down or been swallowed up by the giants in the sector. These shakeouts are healthy. They did not damage the long-term soundness of the auto industry. The collapse of auto sales in the early 1930s brought substantial consolidation, as well-known carmakers such as Pierce-Arrow, Auburn, and Franklin went under or were greatly weakened. But overall, the auto industry emerged from the Great Depression with its position at the core of the

economy more solid than ever. Sales rebounded in 1936 and 1937, and big automakers became the major powerhouses of the economy, a role they maintained well into the postwar era. While we will not see the same concentration in the B2C world as in autos, consolidation is likely in the optical network manufacturers and the telecoms.

The implication for today is clear. No matter how long the tech slowdown lasts and how weak tech stocks become, we will have an information-led economy. This does not mean, however, that the 2000–2001 tech slowdown did not do damage. It did, in terms of the overall economic expansion and certainly in terms of the trillions of dollars of wealth that were obliterated. But there is more to this upwave than just the Internet, and the Net itself will continue to expand. With biotech, nanotech, and fuel-cell technology, this could be a much more powerful upwave than some of its predecessors. Moreover, as history has shown, the tech sector will once again emerge as a leading propellant of growth.

THE NEW ECONOMY: DOWN BUT NOT OUT

The Old Economy is morphing into the New in every sphere. Using the Internet for B2B activities, as we have seen, Old Economy companies are streamlining and dramatically enhancing productivity. In today's world, information from global positioning satellites is used to navigate trucks on the road and robotic arms swing auto parts into place on the assembly line. New breakthroughs in digital technology and the life sciences are finding their way to traditional resource industries. Seismic soundings have dramatically increased the success of wildcat oil drilling.[4]

The Fed understands how important it is that advances in technology and productivity gains continue unabated. The same message was voiced in the Clinton Administration's last Economic Report of the President. It showed that productivity gains had spread far beyond the IT sector into all areas of the economy. The gains in productivity growth since 1995—the true hallmark of the New Economy—are structural, not just the short-term result of an upturn in the business cycle. The President's Council of Economic Advisors estimated that "a structural acceleration of productivity of greater than 1 percentage point has taken place."[5] A combination of investment in information technologies, improving

education and skills of the workforce, and enhancements in the way capital and labor are used throughout the economy are central to the augmented performance.

Better business practices across sectors have been evident. The report shows that, for example, improvements in distribution and supply chain management led to an acceleration in productivity in wholesale and retail trade. Gains emanating from heavy IT investments buoyed performance in the financial and business services sector. Productivity gains were also evident in sectors as diverse as trucking and health care.

DOT-COMS: FROM DEIFIED TO DEMONIZED

Too much euphoria on the upside has now given way to too much pessimism on the downside. It was wrong to hold the dot-coms in such esteem in 1999, but it is equally wrong to find them at such fault in 2001. These Internet companies disrupted tradition and spurred established companies to create new business strategies and models. Now traditional companies of all sizes are understanding and exploiting business on the Net. Many of these firms lost significant market share to the dot-coms, at least initially. But smart ones watched them attentively and adopted some of their innovative entrepreneurial practices.

Indeed, at the 2001 annual meetings of the American Economic Association, Stanford economics professor Robert E. Hall argued that the dot-com stock market boom was not an irrational bubble, but a rational assessment of the prospects for their future earnings, given the knowledge at the time.[6] Contesting the work of Robert Shiller (and others), cited earlier, Hall believes that stock prices move rationally with the expectation of future returns. In other words, the stock market operates on the principle of registering the properly discounted value of the future cash that shareholders expect to receive. Cash-flow growth is the key to understanding the movement in the market. Hall states that it is "illogical to condemn astronomical price-earnings ratios as plainly irrational without investigating the prospects for growth in future earnings."[7]

Hall joined the ranks of those who have highlighted the enormous value of intangibles for many of today's companies, especially for the technology users such as insurance companies, banks, and business-

service firms. There is a strong association between the use of computers and software and the value of these intangibles imbedded in stock valuations. Companies that have a significant "body of technical and organizational know-how"—types of property Hall calls "e-capital"[8]—have the highest imbedded intangible-capital valuations. Industries with low levels of intangibles—and, therefore, rationally low price-earnings multiples—include utilities, oil and gas extraction, primary metals, and airlines.

Unlike Shiller, Hall sees the stock-market boom of the 1990s as eminently consistent with the rational evaluation by investors of future returns; indeed, often investors were too cautious in their forecasts. He used Microsoft as an example of a firm that had immense and rational value owing to knowledge and proprietary technological savvy. The growth rate of cash earned by such tech leaders and innovators has been phenomenal. According to Hall, "A dollar invested in Microsoft stock in 1990 resulted in a claim on $1.38 in after-tax earnings in 2000 alone. Obviously the market in 1990 guessed absurdly low about Microsoft's cash-flow growth."[9]

Hall argues that the main reason why stocks of new Internet companies soared to wild valuations in the first instance was because investors initially believed that only the start-ups would be able to adjust nimbly enough to harness the productivity-enhancing powers of the Internet. Most investors and analysts thought that old-line companies would lack the creativity and imagination, not to mention adaptability, to take the lead online. When Old Economy companies surprised everyone by showing they could effectively compete with the dot-coms, investors realized their mistake, painfully. It became obvious, finally, that the benefits of IT breakthroughs were accruing to the big shots as well, not just to the brash new dot-com start-ups with untried and unorthodox—and most importantly, unprofitable—business models. Valuations suddenly appeared ridiculously high for the start-ups and their stocks plunged—helped along, to be sure, by their extraordinary cash-burn rates and the Fed-induced drying up of cheap capital. This along with the meltdown in the telecom stocks triggered a cyclical slowdown in the economy, which, as we have seen, spiraled throughout the tech sector and the stock market in general.

Smart traditional companies embraced the Net and digitized their business models and processes to leverage the Net in every aspect of their

businesses faster than originally expected. They began to garner the benefits in terms of rising revenues relatively quickly. Their contribution to the revenue and job growth in the New Economy far exceeds that of the dot-coms.

The dot-com bubble may have burst, but the New Economy is far from dead. The New Economy was always about productivity gains and innovation, and it still is. Old Economy companies have embraced the Internet and enhanced their economic performance. Dot-coms are a relatively small part of the New Economy, never representing more than 9.6 percent of revenues, according to a recent study co-authored by Andrew Whinston, a professor at the University of Texas.[10] But the dot-coms have played an important role and will continue to do so.

In the foreword to this book, business strategist Don Tapscott makes a compelling argument that the dot-com fireworks distracted the attention of financial media and business schools from a much larger economic transformation that was precipitated by the Internet: the demise of the vertically integrated corporation. Vertically integrated companies perform a host of functions beyond their core competencies. Functions such as sales, marketing, service, design, and human resources have traditionally been performed in-house because the time, expense, hassle, and risk of partnering with other companies that specialized in such services outweighed the benefits.

With the Internet's arrival, this is no longer the case. Companies can focus on what they do best and partner with other companies to do the rest, using the Internet as the means to coordinate and collaborate their energies. Business webs that allow partners to provide different goods and services are developing throughout the economy. These include sites such as CharlesSchwab.com, LendingTree.com, Travelocity.com, and Siebel.com. Many projects are starting to be executed in much the same manner as a Hollywood movie is produced. The producer, director, screenwriters, actors, cinematographer, and stage hands come together, work intensely, produce a film, and then disband to collaborate with different people on the next film. The ability to identify, bring together, and orchestrate the energies of many disparate entities will distinguish the winners in tomorrow's economy.

DOT-COMS PROVIDED MANY LESSONS

Established businesses wouldn't have acted so quickly were it not for the competitive threat from the online firms. Consider Amazon.com—a truly revolutionary business model. It introduced consumers to a whole new way of enjoying convenience, selection, and price. It not only changed the book business—forcing, for example, Barnes & Noble, the largest bookseller in the U.S., to reexamine its own business model and set up its own dot-com—but it has also impacted retailing in general.

The Net has revamped B2B relationships, resulting in greater value, efficiency, cost reduction, and service. For example, General Electric's former CEO, Jack Welch, mandated an Internet strategy for each of the firm's many business units. The speed of response was accelerated by the threat of competition from dot-coms, at least in some sectors.

The pure-play Web companies accelerated decision-making, taking the concept of "quick and nimble" to new heights. Dell Computer, for example, took the lead with its customized, on-demand production of individual PCs. This approach enhanced consumer expectations about service in all sectors. In addition, the dot-coms altered the standards for boards of directors. Passive boards may have dominated the Old Economy, but in the dot-com world, boards are active and involved. Traditional businesses took notice.

Maybe most notably, the dot-coms changed the talent side of the equation. In the late 1990s, a whole host of successful business managers, MBA grads, and just plain folks left the Old world for the New. Many were burned and many returned, but one thing is certain—they will always remember the excitement of the New Economy entrepreneurial spirit and rapid innovation. The early success of the dot-coms caused a brain drain and labor shortage in the Old Economy, at least initially. Businesses suddenly became very aware of the issues surrounding how to attract, retain, and motivate talent. Established businesses reevaluated their personnel, incentive, and compensation policies. Flex-time, job sharing, training programs, and interesting, innovative incentive plans were introduced. Perks such as daycare, family care, concierge service, health clubs, massages, family counseling, and on-location medical services were offered by many large businesses to keep the talent they so desperately needed.

Investment banks, consulting firms, and professional-services firms were forced to adjust their compensation and profit-sharing systems as many of their ranks headed for the dot-coms and many of the top graduates of the leading professional schools opted for the entrepreneurial world. While the dot-com meltdown of 2000 and the subsequent economic slowdown dampened a good deal of the enthusiasm in 2001, the appeal of consulting and investment banking to the future crop of MBA graduates may well be diminished. Historically, these had been the hot areas, but increasingly, many ambitious young people have something else in mind. The Internet has captured their imagination. Start-ups are not uncommon today in dorm rooms and garages.

Many of the changes the Net companies created in the work environment were healthy and lasting. More casual dress codes and less hierarchical structures have tempered the often stilted and formal cultures of traditional big business. Key professionals today work in teams and on projects, rather than in the traditional pyramidal structures with fixed job specs. People make job choices based on their interest in the nature of the work and the opportunity for learning and growth on the job. Title and rank are no longer as important.

New Economy businesses realized the key to future success is in attracting and keeping the right people. Talented individuals invest their human capital for a piece of the action and for the knowledge it provides. Job-hopping is common. Gone are the days when people joined a firm upon graduation with the intention of staying for forty years.

Surviving dot-coms and new entrants to the Net will learn from the failures. The freedom to fail is a key ingredient in the success of the U.S. as the global technology leader. Older firms have been forced to be more adaptable as well. While the many early B2C dot-com models did not work, new ones will take their place. Internet commerce will blossom and ultimately flourish.

INTERNET GROWTH

Despite the slowdown in the economy and the crash in dot-com stocks, the Internet Economy continued to grow rapidly. The fourth semi-annual

survey by the University of Texas Center for Research in Electronic Commerce, funded by Cisco Systems, showed continued strong growth in 2000.[11] They found that the Internet Economy generated an estimated $830 billion in revenue that year—representing a 58 percent increase over 1999 and a 156 percent gain over 1998. They divide the Net Economy companies into four groups: infrastructure, applications, intermediaries, and commerce. All posted enormous revenue growth in the first half of the year.

The infrastructure companies include the telecoms, Internet service providers, backbone carriers, network hardware and software firms, PC and server manufacturers, security vendors, and fiber-optics makers. This group—which includes names like Epoch, WorldCom, Corning, Juniper, and Hewlett-Packard—enjoyed just over 63 percent growth in revenues in the first half of 2000.

Growing at a 57 percent pace over the same period were the providers of Internet applications such as Web consulting, commerce and multimedia applications, development software, search-engine software, online training, and databases. Some of the companies in this sector are Microsoft, Adobe, Accenture, Oracle, SAP, and Organic. Topping even this stunning growth pace were Internet intermediaries such as online travel agents, brokerages, portal/content providers, ad brokers, advertisers, and content aggregators, with a 103 percent surge over the period. These are companies like Yahoo!, Charles Schwab, Commerce One, ZDNet, and DoubleClick.

Finally, we have the Internet commerce firms, which enjoyed 62 percent growth in the first half of 2000, despite the crash in their stock values. These are the e-tailers, manufacturers selling online, fee/subscription-based companies, airlines selling tickets online, and Net entertainment. Among the names in this group are Target, Amazon.com, Southwest Airlines, Dell, and Road Runner Sports.

The stock market shakeout was even more pronounced in the second half of 2000, as the Internet Economy slowed along with the rest of the economy. Even so, the more subdued growth rate in the Internet Economy was still far from shabby. In addition, according to the report, the Internet Economy directly supported more than three million workers.[12]

Early Days Yet in the Internet Revolution

The Internet opportunity is largely ahead of us. In the next phase of the Net, literally billions of digital devices will be connected to an increasingly powerful, high-speed, broadband, multiformatted Web. A wide array of new applications and services will help companies leverage the Net to communicate and manage their relationships with customers and suppliers more effectively and efficiently. By 2003, virtually all but the smallest businesses will have a Web presence, and many of these will as well.

Mobile e-commerce is also growing rapidly. The proliferation of mobile Internet devices will be spectacular. The "voice Web" will contribute to this as telephone functions and voice services will become available online. Voice, data, and video are converging rapidly into a single Internet-based capability.

Bandwidth will continue to grow. George Gilder notes that the bandwidth on a single cable is already a thousand times greater than the average traffic on the entire Net three years ago. More information can be sent over a single cable in one second today than all the information that was sent over the entire Internet in one month in 1995.[13] This continued explosion in communication capacity will facilitate the development of B2C e-commerce as well as entertainment on the Web, where full-motion video, an e-juke box, and interactive games are already starting to become available. Other portals, such as interactive TVs, media-rich PCs, MP3 players, and game consoles, will leverage the entertainment content. Critical mass is a necessary condition for profitable growth of entertainment on the Web. Many suggest it will take roughly 18 million households with high-speed connections to create the mass needed for lift-off in this area. We aren't there yet. As of the end of 2000 in the U.S., only about 7.3 million households had high-speed connection, but that number is growing rapidly and is forecast to rise to over 20 million by 2003.[14]

B2C Sites—Not All Failures

The great Net shakeout does not imply that all dot-coms will fail. Many survivors have strong revenue streams and good prospects. The leading

online retailers are, by any measure, big, successful companies. The three bellwether stocks that carry the standard for the B2C world—Amazon.com (a book, music, and more retailer), Yahoo! (a portal), and eBay (an auction site)—have become remarkable businesses. Despite the depressed advertising market in 2000–2001, Yahoo! still had revenues of more than $1 billion annually and operating margins of over 30 percent. The other dot-com bellwether, eBay, is also profitable and growing by more than 90 percent per year. Amazon.com restructured its business in early 2001, slashing payrolls and closing a warehouse and a call center in an effort to assure operating profits in the following year. All three e-businesses have expanded outside the U.S., dominating nearly every market they invaded. For example, with eBay's acquisition of iBazar—the French auction site—eBay became the undisputed online-auction victor in Europe. Yahoo! has local sites throughout Europe, Asia, and South America. Moreover, all three are already among the world's best-known brands.

Amazon.com has proved that an e-tailer can, in at least certain categories, beat the bricks-and-mortar competition. Shoppers love the virtually unlimited selection of books, music, and videos—complete with ratings and reviews—and its fast-growing electronics business turns around its inventory two to three times faster than offline competitors. Yahoo! invented the portal and used the Net to create a media behemoth that originates practically no content of its own. It has evolved from a simple directory to a media and commerce giant that has become a Web leader in everything from financial information to personal ads. eBay has proven that the Web is a terrific means to create an efficient market where none previously existed.

Consider how eBay compares to, for example, Sotheby's. eBay is solely an intermediary—it has no inventories and does not direct transactions. It simply provides the unattended software on a Web server that allows a seller to conduct an auction, receive payment, and ship the merchandise. No one at eBay is directly involved in the process. For what is essentially a mating service, bearing zero marginal cost to the company, eBay receives between 7 and 18 percent of the sale price. Its capacity to conduct auctions is nearly unlimited.

The model for Sotheby's is very different and far less efficient. Trained auctioneers and other personnel must assess, store, and handle the

merchandise. Showroom space is limited, as is the number of auctions that can be conducted at any one time. Inventories are expensive to insure and the number of people who participate in the auction is limited. For all but the most expensive goods—and possibly even for them—the eBay site, which attracts a huge audience, is preferable for the seller; and it is the seller who chooses the locale and pays the fees. Network effects are strong. As eBay grew, more people wanted to use the site, encouraging further growth. This process allowed eBay to beat any fledgling competitors.

Without doubt, even the strongest of Internet players have had their problems and may find that they need a bricks-and-mortar connection to excel in the future. As the sector matures, its leadership may consist of fewer pure-play firms. For example, Yahoo! could well benefit from a traditional content producer, particularly as AOL has merged with Time Warner.

The Dot-Com Model—Profits Are Essential

Other dot-coms are improving their financial performance, indicating they are learning as the Net evolves. However, many are still struggling. They are not just facing off against each other anymore, they are competing against established businesses and traditional business models. The struggle to turn thin gross margins—the raw profit before paying salaries, advertising, warehousing, handling, and other overhead costs—into bottom-line profits is daunting for many. But the true power of the Net will not be realized until it is profitable. Productivity growth must be translated into bottom-line earnings. The potency of the technology is unassailable, but profits—or the promise of them—is vital. There is no future in losing money and making it up in volume unless increased volume really does reduce costs.

The industry is in a period of dramatic soul-searching agitation. Yahoo!, for example, began charging companies that list products on its online auction site. Amazon.com and Bluefly—an online seller of designer clothing—have raised prices and shipping fees. Barnes & Noble is selling downloadable books on its website and offering big royalties to lure authors.

Bertelsmann AG, the German media powerhouse, broke with the rest of the music industry to cut a deal with Napster, instead of suing it like so many of the other giants in the music industry. The trick was for Napster—with Bertelsmann—to come up with a way to distribute music online without violating copyright laws. Napster announced in early 2001 that it would be charging a monthly subscription fee to reimburse royalties to recording companies—a significant shift from its free song-swapping beginnings. Napster lost an appeal to overturn a lower court ruling that it must stop offering music under copyright, so it stayed alive by screening the file names that passed through its computers, blocking the exchange of pirated tunes. However, its users have delayed this effort simply by using aliases for band names. Meanwhile, Napster and many other companies, including the record labels, have been scrambling to create a digital rights management system that would be convenient and allow payment. If the music industry pushes Napster too hard, its 50 million clients will go underground, using copycat programs, technology, and sites. Some alternatives are decentralized, unlike Napster, so they couldn't be shut down with a single power switch, making court orders harder to enforce. This fact may buy Napster time to "legitimize" itself in the eyes of Recording Industry Association of America.

Companies like Bertelsmann recognize that the old business model is no longer viable. It is working hard to develop an innovative new one. But this isn't so easy. As many unprofitable dot-coms have found, people underestimate how long it takes to come up with a new business model that works—for the consumer and for the shareholder.

Some Budding Attempts

Consider, for example, one of the Net's better-known brands, Priceline.com, which made news in late 2000 when one of its highly publicized lures from the Old Economy, Heidi Miller, former CFO of Citigroup, fled along with other key executives after only a brief stint. Priceline's "name-your-own-price" or "demand collection" system is one of the pioneering ideas in e-commerce. Yet the company has lost millions of dollars and its stock sank from a high of nearly $96.00 on March 13,

2000, to a low of $1.31 at year-end. Its core business has been selling airline tickets, but it moved beyond that with little success, as the name-your-own-price system seemed to put off consumers.

Most importantly, Priceline has trouble turning a profit even in the airline-ticket business, because its expenses are so high. Priceline buys tickets for unsold seats that the airlines heavily discount, then marks them up to earn a gross margin of 9 to 12 percent, compared to only 5 percent for offline travel agents. The rub is, the company has poured its gross margins from the airline tickets, as well as hundreds of millions of dollars raised in its stock offerings, into largely failed forays into other product lines. Also depleting cash were their expensive computer systems, high-priced software programmers, and glitzy ad campaigns featuring William Shatner.

Priceline could be profitable tomorrow if it cut costs and focused on the core airline-ticket business, but even there it is running into trouble. The airlines themselves want a piece of this action. Like so many other pure-play dot-coms, its success—at least in terms of revenues—has lured the traditional players into its markets. A number of the major airlines backed a competing start-up, Hotwire.com, that sells cheap airline seats. While Hotwire doesn't tell customers up front which flight they are taking or how many connections they will need to make to get to their destination, it does reveal the price of the ticket, rather than requiring the consumer to bid. Many consumers are put off by Priceline's complicated system that requires a user to guess what the ticket will go for, place a bid, and then check back later to see if the bid was accepted. Hotwire may well force Priceline to reduce its gross margins. Priceline is still struggling with its pricing model, assuming that the airlines will continue to give it first crack at cheap seats because it does not reveal the true price of the ticket, theoretically protecting them from having to match the price for other customers.

Priceline, like so many other dot-coms, is in a make-or-break period. Execs are reconsidering their pricing model and their nontravel businesses. Many analysts are skeptical, suggesting their best option may be to merge, be taken over, or go private. In the meantime, the cash is running out.

Other Examples—Bluefly and Webvan

Bluefly's blueprint was similar to so many other dot-coms: Undercut the prices of the traditional bricks-and-mortar businesses and make up the difference through the efficiencies and reduced-cost structure of a Web-only business. In Bluefly's case, the product is designer clothing; it calls itself "the outlet store in your home." For Bluefly, like so many other dot-coms, the efficiencies did not surface. Indeed, in many ways its costs are higher than for traditional retailers.

In this business, profit begins with markup, the amount retailers charge above what the goods cost them wholesale. Bluefly's strategy was to keep the markup low to attract shoppers and to assure they return. This certainly was good for the Bluefly customer, but hell for the Bluefly shareholder. Bluefly's gross margin was only 28 percent, well below the more typical 48 percent at Lands' End (which sells its own private-label merchandise at much bigger markups) and the 40 percent at Macy's parent, Federated Department Stores Inc. After expenses, Bluefly has been losing millions.

The thinking was that without the traditional costs of stores, clerks, and catalogs, the online outlets could thrive on very thin profit margins that would drive their unwired competitors out of business. But this business model did not work, not for eToys, Pets.com, Garden.com, Furniture.com—or for Bluefly. Taking orders directly from customers, whether by phone like the catalog companies or by the Net, requires expensive computer systems underpinned by customer-service representatives. It also means operating a warehouse or paying someone else to do it, keeping a ready supply of the most popular items, handling the items one by one, and shipping them at often great expense. The logistical problems can be enormous. And then there is the high rate of returned merchandise, much higher than that for store-based shopping where the items can be touched, seen, and tried on. This is why most catalog companies sell largely their own brands for which the markup can be much greater. Even traditional retailers such as the Gap or department stores like Sears, Saks, and Bloomingdale's intersperse their own brands throughout the product lines and pitch them heavily.

Bluefly and the similar dot-coms' only choices are to raise markups and to reduce costs. This means they have to get goods for less and/or charge more to the customer. Suppliers do discount larger volumes of goods, so scale is important. Fulfillment costs also fall as volumes rise. As well, return rates can be reduced with better information and descriptions on the site. But, even with all of this, analysts feel that Bluefly and the others must raise price to achieve the 38 percent gross profit margin some say is necessary for an online company to prosper. This is tough because shoppers do a lot of price comparisons online—more than in the stores—because it is so easy. This is one of the beauties of the Net, at least for customers. This enormous price pressure was the death knell for many dot-coms. But consumers also like the convenience, selection, and service of the Net, and they will be willing to pay for it. For example, when Bluefly raised its shipping charges in the summer of 2000, there was no customer backlash.

But, clearly, the challenges are real for the online retailers. Volumes are crucial, but growing sales require costly advertising and rock-bottom pricing. Repeat orders and big orders are the key. Online grocer Webvan has found it impossible, thus far, to turn a profit on the average order. The margins are just too thin and the costs of delivery and handling are too high for most items. That is why the traditional dairies and grocery stores gave up their home-delivery services years ago. Other than in high-income, densely populated areas like Manhattan, these services disappeared in the 1950s. (Remember the milkman?) Also, consumers have to plan ahead to order online. For items like groceries, many will want to continue to just pop into the store when the need arises.

There is demand, however, for the convenience and service of online (grocery) shopping. With the surge in busy two-income families with young children, it is a real lifesaver for many professional women. A frequent-buyer program might help to lock in customers. But the beneficiaries of this 1950s-style convenience are going to have to pay for it, and the Webvans of the Net are going to have to make sure their service, product quality, and selection are consistently up to snuff. These sites are in the process of widening their product offerings to include a growing array of high-margin products, such as cosmetics and nonprescription drugs. They could also act as the "last-mile delivery"

operation for other Internet and traditional merchants—such as dry cleaning, photo finishing, and book and flower delivery.

For Webvan, time is running out. It was founded by Louis Borders, the reclusive mathematician who started the eponymous bookstore chain. He focused exclusively on building a complex inventory management and distribution system, which turned out not to be worth the money. With operations in ten cities, the company burned through $100 million in cash a quarter. It was also overzealous in its expansion plans, setting out to enter twenty-six cities long before it had proved that its model worked. Webvan abandoned these plans, but the jury is still out. The stock price fell 99 percent from its high. If Webvan fails, it will be by far the biggest financial disaster the Internet has yet seen.

Not the First Such Challenge: Radio Struggled Too

The Internet companies do not face this challenge without historical precedent. Radio in its early days provides an illuminating case study. It took years for a viable business model to develop in the radio industry, well after the public had fallen in love with the new medium. The model that finally emerged was not immediately obvious. Radio began as a way for one person to communicate with another. Radio Corporation of America (RCA), founded in 1919, charged a fee to sender or recipient and prospered by undercutting the price of telegrams.

This changed when radio broadcasting became popular in 1922. Radio was truly the first WWW, as the early RCA logos sported the buzzwords "World-Wide Wireless."[15] The transition to broadcasting shifted the viable business model in uncertain ways. Everyone knew the new medium was wildly popular, but no one knew how to make real money at it. At first, RCA made money selling radios. To encourage sales, RCA and other radio manufacturers, universities, and churches sponsored radio stations to provide content. But this was quickly seen to be unsuccessful.

Some suggested a tax on listeners. The British charged radio owners a fee to finance the BBC. One obvious solution was paid advertising, but

in the early days these were tough to sell and quite controversial. Just as in many locales there still are no ads before the trailers at big-screen movie theaters, ads did not show up on radio until national networks were created. In the 1920s, ads were seen as an intrusion at best and unethical at worst.

While ads did work for radio and TV, it is unlikely that they will be the answer for Internet companies. Radio and TV are mass-market media, with pre-arranged, set programming. The Internet, instead, offers customized content. The business model must reflect that. Amazon.com is betting that if it gets big enough fast enough, it will be able to charge enough to make money. We will see.

Subscriptions and fees may be part of the answer. Satellite radio stations are charging low monthly fees. Many dot-coms are looking for new revenue streams. A natural one for some would be to offer their valuable software technology to other noncompeting companies for a price. Some are already moving in this direction. Yahoo! is building private-label corporate portals—intranets for a company's employees—for internal use and setting up conferences over the Net. The fees for this will not be chicken feed. Yahoo! is hoping to earn roughly $200 million for this service in 2001, accounting for a fifth of expected revenues that year. Yahoo! had little choice but to diversify given that online advertising fell sharply with the economic slowdown.

Others are following a similar strategy. eBay is hosting storefronts for small and medium-sized merchants, similar to Amazon.com's zShops. Amazon.com has taken this a step further, however, with its agreement with Toys "Я" Us, which pays to sell its products through Amazon.com's software and warehouses. Amazon.com is planning to do similar deals with other retailers whose products are too limited or seasonal to warrant their own stand-alone site. Quite a few smaller e-tailers—from Ask Jeeves to Respond.com—are also selling private-label versions of their sites to big companies in an effort to move away from excessive dependency on consumer shopping revenues.

The B2B space offers other possibilities similar to eBay's fee-for-service system. Commerce One, a leading B2B company, gets most of its revenue from selling and servicing its software. It plans, however, to charge for each transaction on its electronic marketplaces.

Certainly the enhanced service, selection, customization, and convenience of the Net is here to stay and worth paying for. Customers will become increasingly used to all that the Net has to offer and will refuse to go back to the long lines and low inventories of bricks-only shopping, even as the traditional retailing experience improves in response. But shoppers will have to be willing to pay for this in some way. The Net participants will figure it out, but it will take time, and the shakeout in 2000–2001 was very much to be expected. The 1922 radio euphoria was followed by a meltdown. Of the forty-eight stations that were first in their states, twenty-seven went out of business by 1924. It took this kind of churning for the new business model to emerge.

THE FUTURE IS BRIGHT

As the Internet economy heads into full throttle and a more mature stage of expansion commences, the bio-economy is heading into its growth phase, when hot new industries appear and mind-spinning developments occur. During the next twenty years, organic biotech will intersect with inorganic infotech, materials science, and nanotechnologies. The pace of change will accelerate and the gains will be breathtaking.

We are in the early days of this upwave in the long cycle—the innovation cycle that has boosted productivity growth and increased living standards in astonishing ways—and the best is truly yet to come. Although these technological breakthroughs are not without their problems and challenges, the U.S. and the rest of the world will benefit from them. Many people, however, are frightened by them. We turn now to a look at globalization, the spread of capitalism around the world, and the leadership of the U.S. in the technology revolution.