

# 2000 Sterling's World Report



STERLING'S  WORLD REPORT

## The Evolution of Revolution

Tired of hearing about the New Economy? Tired of hearing about how the technology revolution is transforming the financial markets?

You're not alone. At least one prominent economist is fed up and is fighting back. Robert Gordon of Northwestern University has recently published several papers debunking the idea that the overall economy is benefiting in a major way from the computing revolution. He argues that most of the gains in productivity seen in recent years are concentrated almost entirely in the production of cheaper and faster computers.

His words of warning go further:

"The rapid onset of diminishing returns suggests that the greatest productivity contribution of computers lies in the past, not in the future. Enthusiasts should reconsider whether the new economy and Internet will transform everyday life as profoundly as did electric light, the electric motor, home appliances, the commercial aircraft, and other components of the second industrial revolution of a century ago."

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## The Evolution of Revolution (cont'd)

As investors, it makes sense to be skeptical of “new era” enthusiasms for a simple reason: many of the new era enthusiasms of the past ended in tears for investors who got carried away with one fad or another. So we treat Gordon's skepticism with respect.

And with respect, we believe he is completely wrong. In our opinion, the technology revolution is still in its infancy and many core technologies are far from reaching the point of diminishing returns.

Innovation is not likely to be limited to computing technology. In the area of telecommunications, for example, technical progress is proceeding at a rate far faster than in computing. This means that the information carrying capacity of the global communications system should expand at least twice as fast as growth in the number of transistors per chip. And the interaction of the computing revolution with the telecommunication revolution is what's driving the rapid buildup of the global Internet infrastructure.

Moreover, the Internet has huge and profound spillover effects into other industries that are also experiencing revolutionary changes. Who can doubt that the study of the human genome has accelerated dramatically because of the ability of scientists around the world to immediately

publish their discoveries on the World Wide Web? Likewise, since the written version of the human genome is a code that takes up the equivalent of 300 copies of the Bible, the number-crunching capabilities of ever-cheaper supercomputers has been critical in speeding up drug development research based on genomics.

Don't get us wrong: we are big fans of electricity and home appliances. We know that previous waves of innovation during the industrial revolution had major consequences for living standards and wealth creation that are tough acts to follow. But we also think that there are several unique aspects of the current technology revolution that may justify applying what has been called the most dangerous phrase in investing: “This time is different.”

To be sure, we have witnessed many technology revolutions in the past few centuries. On a “greatest hits” list of new technologies, such as one from economist Michael Cox shown in Chart 1, the Internet may not even rank in the top five. But we think that there are several distinguishing characteristics of the current technology revolution that have fairly radical consequences for the investment environment:

1. It's not a revolution — it's multiple revolutions.
2. The pace of revolutions is speeding up dramatically.
3. The scope of revolutions has become truly global.

In other words, investors need to think carefully about what we call “the evolution of revolution” because the very nature of technology revolutions is evolving rapidly.

### You Say You Want a Revolution?

We have already touched on the first point. The technology revolution is not just about computers. It's also about telecommunications. And biotechnology. And material sciences. And alternative energies. And more to come.

In our opinion, these multiple revolutions are coming together to produce an explosive wave of innovation unlike anything we have witnessed before on the planet. They are likely to produce trillions of dollars of new

### TOP 10 INVENTIONS AND DISCOVERIES SINCE THE CIVIL WAR

• Electricity	1873
• Microprocessor	1971
• Computer	1946
• DNA	1953
• Telephone	1876
• Automobile	1886
• Internet	1991
• Television	1926
• Refrigeration	1913
• Airplane	1903

Source: Myths of the Rich and Poor, Cox & Alm

Chart 1: Academics may quibble about what the most important inventions and discoveries have been, but this list does a good job of capturing the “greatest hits.”

wealth in the years ahead. In the process, they will radically alter the balance of power in the global economy. No industry or firm will be immune from the massive technological change that will engulf the global economy in the years ahead. It becomes difficult, if not impossible, to cluster firms according to traditional industry classifications and makes life challenging for people who can't think outside the box.

### The Acceleration of Just About Everything

Speed is another distinguishing aspect of the current technology revolution. As instantaneous communication spreads information rapidly, new technologies are entering our lives faster than ever before. For example, it took only about 16 years after the introduction of the personal computer before a quarter of American households owned one. Cellular phones, introduced in 1984, spread to a quarter of households in only 13 years, and it took only seven years before a quarter of households were online.

In the past, it often took many decades before new products became a part of everyday life. Electric power was introduced in the 1870s and was not universally available until 50 years later. Mass-produced autos were introduced in the early 1900s, but there were more horses than cars in America into the 1920s, and it took around 35 years before a quarter of households had cars.

Science journalist James Gleick has recently documented the pronounced speedup in human affairs in an intriguing little book called *Faster: The Acceleration of Just About*

*Everything*. The investment implications of “the acceleration of just about everything” are far from trivial. The reason has to do with the basic mathematics of compound interest. If a security is worth the present discounted value of its future cash flows, companies with more rapidly growing cash flows will naturally be valued more highly than companies with slow or stagnant cash flows.

Accordingly, in a world with an explosion of new business activity and new business models capable of generating rapid growth, PE ratios and other market valuation measures are unlikely to “revert to the mean” anytime soon. And, as we have discussed in previous *World Reports* (see “Financial Future Shock,” June 2000), the acceleration of technology has been accompanied by faster “cycle times” in the world of finance.

In Silicon Valley, for example, venture capital firms have demanded astonishingly short life cycles for the companies they finance — on the order of 18 months from the birth of a new firm to initial public offerings. Investors and market makers have accepted this for a simple reason — everything else is speeding up as well. In software development, manufacturers are beginning to think in terms of six-month product cycles. And consider the comment of one Silicon Valley management expert on business planning cycles: “Five-year plans? For managers who get it, it's more like a five-week schedule inside a five-month plan inside a 15-month intuition.”

Reflecting the need for speed, as of the end of last year 68 of the top 200 technology companies by market capitalization had become public within the last three years, while 39 had become public within the last year alone. Clearly, the risk characteristics of such stocks will be very different from those of more established companies, which may explain the extraordinarily high level of market volatility recently seen in technology stocks. As we noted in June, these are not your grandparents' utility stocks.

### Going Global

Another distinguishing feature of the current technology revolution is that it is truly global in scope. To be sure, waves of technological innovation in the past have spread from country to country in due course — think of steamships, railroads, and airplanes. But now, with nearly instantaneous, high-bandwidth communications and

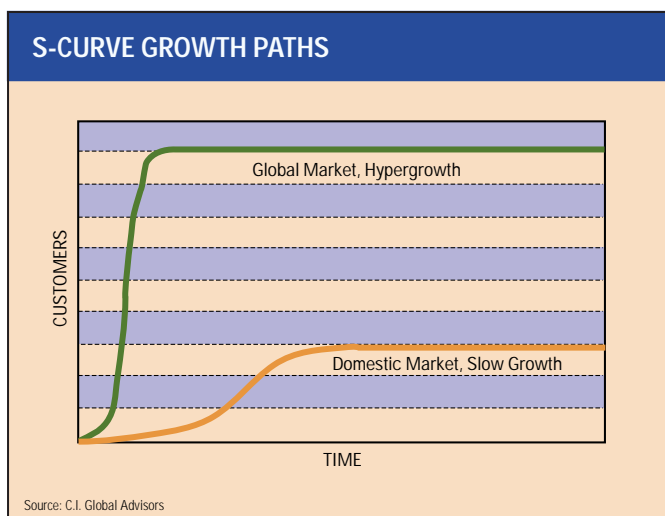


Chart 2: S-curves are typically used to describe economic growth. Recent S-curves have tended to go vertical, reflecting hypergrowth.

relatively open trade policies around the world, the scope for innovations to rapidly go global is unprecedented.

The Internet is a case in point. America was an early adopter. Internet use in Europe and Japan has grown rapidly and Internet service providers can now be found in remote areas around the world. For firms with new technologies that are in demand around the world, the size of current market opportunities is unprecedented — and that has helped contribute to unprecedented valuations.

Again, it comes down to simple mathematics as shown in Chart 2. Imagine a purely domestic company that focuses only on the U.S. market. It would have an “S-curve” of growth starting from zero market share to a potential 100 per cent share of a market of 270 million consumers. An analyst running the numbers on such a domestic company would naturally limit any cash flow projections to whatever the domestic market could support.

Imagine that the same company had the opportunity to market its product globally, to nearly six billion consumers. Assuming that the product was in demand, and that global distribution was facilitated by cheap communications and reasonable transportation costs, the firm would now naturally deserve a much higher PE ratio than if it stayed purely domestic. As they say in Silicon Valley, “do the math.”

Now consider how many of the successful computer, software, pharmaceutical, and financial services firms of America, Canada, Europe, and Japan have gone global in the past decade. From this perspective, it would be extraordinarily odd if there were not a group of global companies that enjoyed substantially higher valuations than purely domestic firms.

And that is exactly what we have seen in the U.S. market, where the median stock still trades at about 14 times earnings while the overall market trades at 29 times earnings on average. The average is high because of a select group of global, rapidly-growing companies whose shares trade at substantially higher multiples than the rest of the market. And, as Chart 3 suggests, why shouldn't they?

### Thinking Outside the Box

The bottom line: if you're not confused by today's investment environment, you're probably not paying attention. There are multiple technology revolutions now underway. They are proceeding at faster speeds than we have ever seen, and they are unfolding on a global stage.

These new industries often have unusual economic dynamics characterized by increasing returns of scale, positive feedback effects, winner-take-all outcomes, and intangible balance sheet assets. Our prediction: in this environment, conventional investment management tools (value/growth/large-cap/small-cap) are going to prove increasingly dysfunctional.

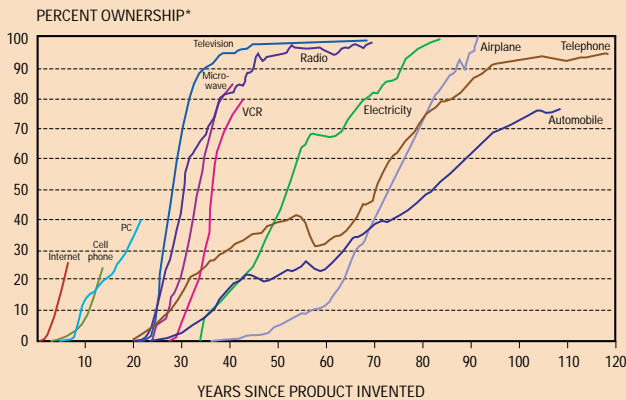
We think the next two decades will favour those investors who can think outside the box — or boxes. The key will be to ride out the volatility associated with high levels of confusion by ignoring the daily and weekly wiggles and waggles in financial markets.

As always, our advice is to keep your seat-belts fastened. In the meantime, enjoy the rest of your summer and we look forward to seeing many of you during our trips to Canada this fall.

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### THE SPREAD OF PRODUCTS INTO AMERICAN HOUSEHOLDS



\*Percent ownership refers to the fraction of households that enjoy each product, except for the airplane, automobile and cell phone. Airplane refers to the percentage of air miles traveled per capita relative to miles traveled in 1996; automobile refers to the number of motor vehicles relative to persons age 16 and older; cell phone refers to the number of cellular phones per registered passenger automobile.

Sources: U.S. Bureau of the Census (1970 and various years); Cellular Telecommunications Industry Association (1996); The World Almanac and Book of Facts (1997).

Chart 3: Which growth path will command a higher valuation-global hypergrowth or domestic slow growth?